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MODEL AIRPLANE NEWS

48120 November 1990

THE WORLD'S PREMIER R/C MODELING MAGAZINE

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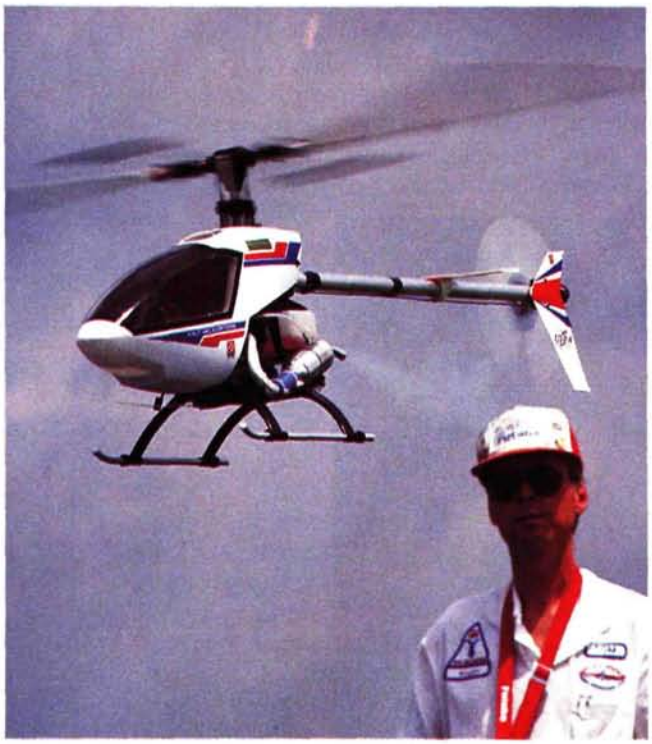
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NOVEMBER 1990 VOLUME 118, NUMBER 11

MODEL AIRPLANE NEWS



ON THE COVER: New editor Tom Atwood demonstrates fine-tuned kit-bashing technique—marrying incongruous fuselage/wing pairs! Shot was taken in model hangar owned by Dick Purdy, who's a MAN contributor and the subject of our "Over the Amazon" sidebar on page 47. ***Above:*** *Tom Dooley flies the Kalt Enforcer. (See page 92.)*

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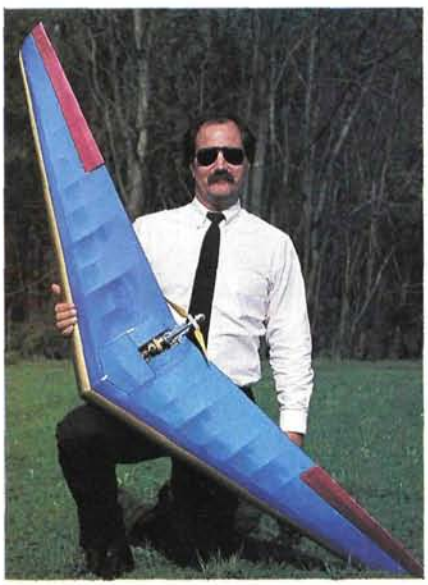
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EDITORIAL

by TOM ATWOOD

THIS IS A GREAT TIME for our hobby! The recent Princeton wind-tunnel tests have expanded our knowledge of model airplane (low Reynolds number) airfoils; R/C equipment continues to improve; there's an increasing selection of kits, semi-kits and ARFs; advanced electrics are on the rise; and there's an ever-expanding array of materials and techniques for scratch-builders. Exciting stuff!



This is also a great time for me, because this issue is my first as editor of *Model Airplane News*. This job is both rewarding and challenging. In the course of putting this issue together, I've enjoyed speaking with dozens of present and future contributors, and reading a fairly hefty stack of mail from you, our readership.

You're probably asking, "Where did this guy come from?" Despite my appearance on the cover, my background does *not* include trying out for "Monty Python's Flying Circus"! I do have most of a decade in publishing, several years in computer marketing and, of course, a life-long interest in modeling. My interests have spanned scratch-built ornithopters to $C0_2$ free flight to R/C, which has been a consuming interest since the mid-'80s. As editor, I'm dedicated to bringing you the *best* coverage of new products, events, and traditional and high-tech how-to articles that will help you improve your skills as a modeler and flier—all facets of our great hobby. Stay tuned for design contests, software reviews, more pilot projects, the off-beat and the "fun" side of the hobby.

R/C modeling is great because we can be artists, designers, aerodynamicists, test pilots and—yes!—even flying-field hams! Our "Kit-Bashing" section takes a closer look at this brand of fun. Also in this issue, we preview new batteries that promise longer flight times between charges for both glow and electric! Scale and movie buffs: don't miss the PBY behemoth captured in the article on the models used in the movie "Always." For plans builders, here's early notice that our December issue will include our *48-page* Plans Directory (our holiday gift to you)!

Some late-breaking news: as I write, Bob Benjamin has qualified for the Scale Masters with an Astro 25-powered, electric Porterfield Collegiate (see "Quiet Flight"). We hope it went well at the Texas Masters, Bob! And special congratulations go to the U.S. team who took 2nd place at the F3E R/C Electric World Championships in Freistadt, Austria, in August. The team's Jason Perrin placed 2nd after Austria's Rudolf Freundenthaler, who has twice been world champion! Just two years ago in St. Louis, our team came in among the last, so this year's result was quite an achievement! Way to go! More on the competition, the planes and our team in the future!

If you want to contribute to our pages, drop me a line!

MODEL AIRPLANE NEWS

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Publisher
DR. LOUIS V. DeFRANCESCO

Associate Publisher
YVONNE M. MICIK

Editor-in-Chief
TOM ATWOOD

Associate Editor
CHRIS CHIANELLI

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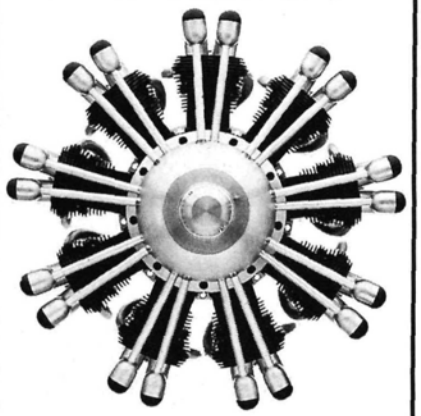
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AIRWAVES

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AMA Responds

In the September issue of *MAN*, you printed, and responded to, a letter from Rev. Richard A. Krause concerning a company reportedly operating model R/C aircraft at illegal transmitter power levels. As stated by Rev. Krause, the Academy did communicate, by letter, with the company involved. No accusations were made in the communication; rather, a request was made for any information the company could provide relative to the interference concern. While the issue isn't closed, please understand that evidence of a continued problem of this nature *hasn't* been presented at this time. In fact, other than a letter from the company and another from the affected party (thanking the Academy for its initial action), there hasn't been any communication from the parties involved.

I have no comment concerning the statement that an "AMA representative suggested we build a 200W transmitter and shoot them down," other than to relate that this office did not make a statement of that nature. It's possible that if such a statement was made, it was in a facetious manner when the individual wasn't aware of a course of action.

Just as clarification, please let me relate that Rev. Krause is incorrect regarding AMA insurance. He states that, "AMA only pays if you crash on an AMA sanctioned field, and if you're a member of an AMA sanctioned club." Not true! To begin with, there is no such thing as an "AMA sanctioned field." We don't qualify or "sanction" flying sites. Further, you don't have to be a member of an AMA *chartered* ("sanctioned") club to be insured. As long as an AMA member flies according to the very basic AMA Safety Code, he is insured whether he is at a regular flying site or is a member of a club. Obviously, we encourage members to belong to a chartered club and fly at established flying sites.

Last, Rev. Krause indicates we never inform members about important matters as does the National Rifle Association. I assume he's referring to legislative matters such as those that come from the FCC and FAA. I suggest that a careful reading of the AMA news sections of *Model Aviation*, as well as other publications that print the action items we provide them, will help to alter that opinion. Significant activity occurs in these areas and is reported on regularly in various ways.

In the future, if you receive letters or manuscripts that contain statements such as those made by Rev. Krause, please understand that the Academy would be most willing to provide information that will clarify the issues or claims made concerning its policies. Inaccurate information is counterproductive for all parties concerned.

ROBERT UNDERWOOD
Technical Director, AMA

Thank you for the response and clarification on insurance, Robert. We'll continue to share all points of view on these important matters! TA

Twin Conversion

I've been reading your magazine for the last two years and feel it's the best. I'm mostly interested in sport and sport-scale flying, and the articles have enlightened me considerably.

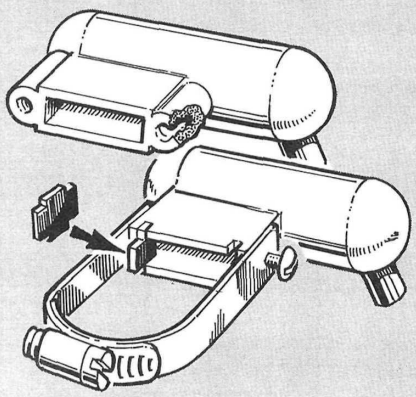
I'm embarking on what is, to me,

(Continued on page 14)

HINTS & KINKS

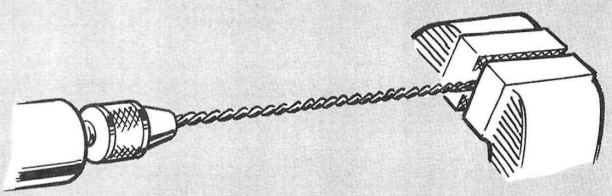
Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send a rough sketch to Jim Newman, c/o **Model Airplane News**, 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

by JIM NEWMAN



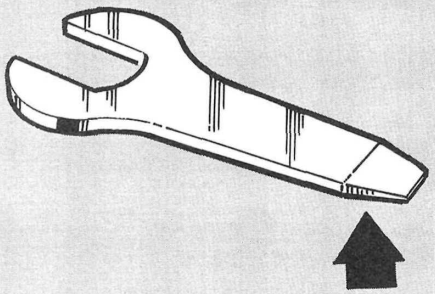
MUFFLER REPAIR

If you've damaged muffler-mounting lugs, try this "salvaging scheme." Saw and file off the lugs, and cut a hose clamp of a suitable size in half. Drill the clamp and the sides of the lugs, tap the lugs to accept short 4-40 screws, and clamp the muffler to the cylinder. To prevent the muffler from moving up and down, fit little mild-steel keys (arrowed) into saw-cut slots. *Kurt Provenza, Elyria, OH*



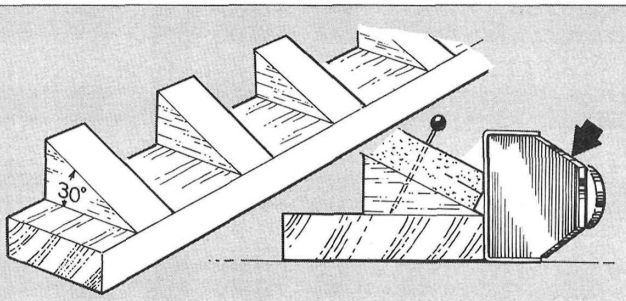
NEAT WIRE TWISTING

Have you ever made two-wire extension leads and had trouble twisting the wires together neatly? Hold the ends of the wires in vise jaws, and lock the other ends in a drill chuck. By running the drill very slowly while keeping tension on the wires, you'll make neat twists! *Keith Hanne, Bettendorf, IA*



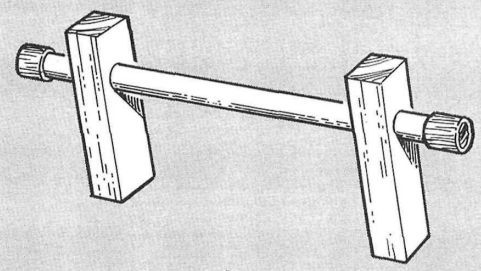
DREMEL WRENCH/SCREWDRIVER

To eliminate the need for a separate screwdriver when changing cut-off discs or slitting saws, grind the end of a chuck wrench into the shape of a small screwdriver that's sized to fit a mandrel screw. Now you have two tools in one! To keep this gadget close at hand, why not tie it to a power lead? *Marcos Brandao, Ft. Collins, CO*



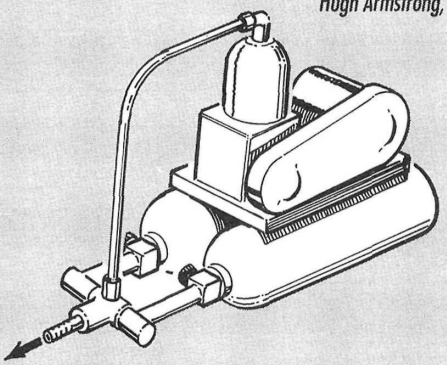
PLANING JIG FOR HINGE EDGES

This simple fixture allows you to plane 30-degree angles into the hinged edges of control surfaces. For example, pin an aileron to the wedges so that its center line is vertically over the jig's guiding edge; then, using a small hobby plane (arrowed), you can bevel the edge quickly. Jim suggests that you make a hardwood base and cedar wedges, but you can also use very hard balsa and face the guiding edge with birch ply. To preserve this, plane very gently. *R.J. Benner, Lansing, MI*



BAR CLAMPS

These useful, inexpensive bar clamps are made with two hardwood blocks and a dowel that's approximately 1/2 inch in diameter. The holes drilled in the blocks are 1/64 inch larger than the dowel, and the wedging action of the part under pressure locks the clamp blocks into place. If they slip, simply rosin the dowel. To keep the blocks from slipping off the dowel, use tape or a small wood screw on the dowel ends. *Hugh Armstrong, Hoquiam, WA*

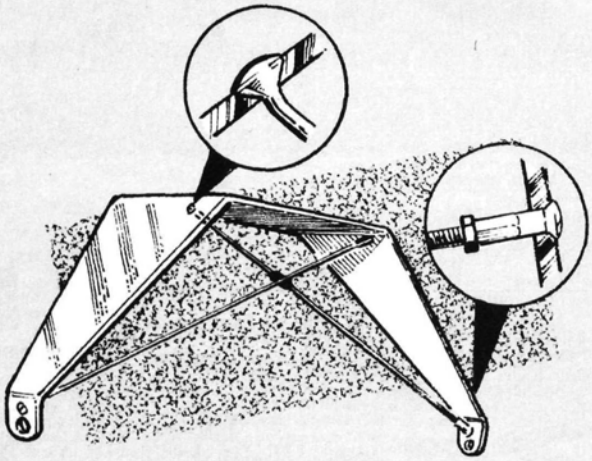


COMPRESSOR RECEIVER

When you use an airbrush with a small compressor, it sometimes sprays in spurts because of uneven air flow. The solution?—tape a pair of empty DP propane tanks together, and, using cut-down torch heads and suitable fittings, couple them to the unit with copper pipe. You now have a smooth air supply for your airbrush! Attach the compressor to the tanks with double-sided tape. Note: use only DP tanks because they have built-in safety valves. *Henry Loos Sr., Waterford,*

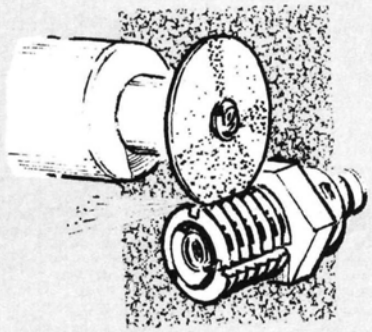
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HINTS & KINKS



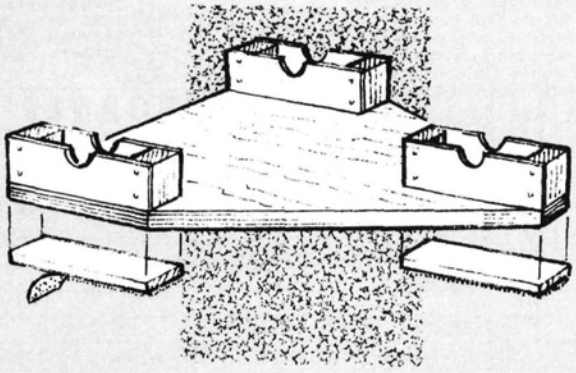
GEAR RETAINER

Want a tidy way to prevent overloaded sheet-metal gear from splaying out? Drill and countersink holes in the sheet metal, and insert cycle spokes of the appropriate length (as shown). To prevent the spokes from vibrating against one another and causing radio interference, use Loctite on the nuts and a binding or plastic tape where the spokes cross.



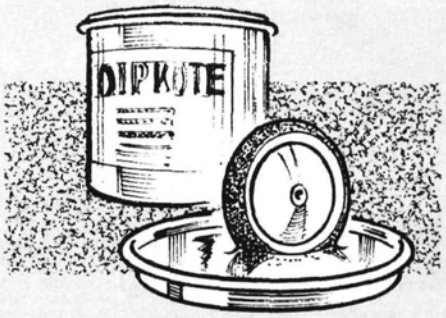
THREAD "CLEANER"

Damaged cylinder-head threads can be cleaned using an old plug slotted with a Dremel grinder disc. To prevent metal chips from falling into the engine, be sure to remove the head first.



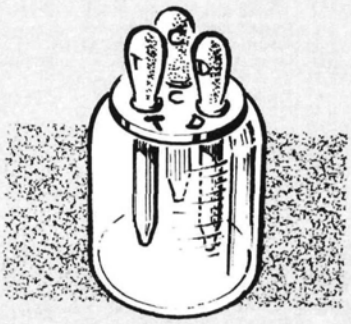
MODEL RACK

This wheel-chock board is made of ply or Masonite and prevents models from rolling around in the back of your car or truck. To prevent the unit from sliding, glue no. 80-grit sandpaper to the wooden strips, or feet.



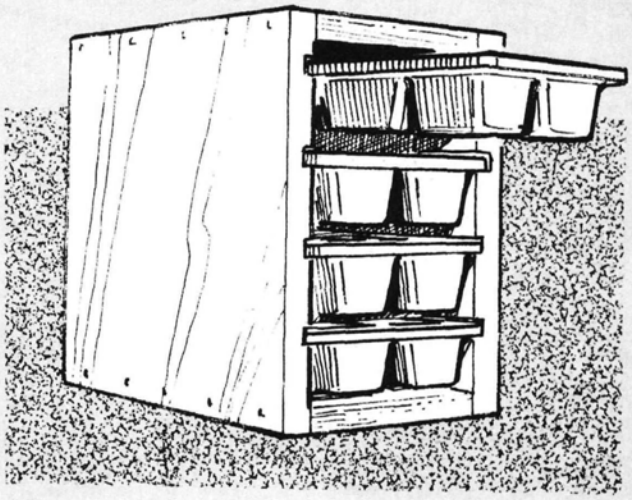
TIRE DIP

Here's a clever way to make very realistic miniature tires (e.g., tail wheels) for small R/C models. Just roll balsa or plastic wheels in a shallow lid filled with liquid rubber. (Usually used for coating tool handles, this material can be found at hardware or auto-parts stores.)



EYEDROPPER HOLDER

Here's a handy receptacle for the eyedroppers you use to dispense thinners, dope and catalyst. The droppers rest in holes punched in the lid, and the jar collects all the drips!



PARTS TRAY

This small-parts rack is made with inexpensive plastic ice-cube trays. Groove the sides of the rack on a table saw, or use plastic strips glued onto form runners.

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ESCAPE

SPECIFICATIONS:

Wing Span	62½ inches
Wing Area	770 square inches
Engine Size	10 cc
	90 or 120 four stroke

Designed for AMA for the FAI Turn-around pattern. Foam wing and stab with 3-32 Balsa sheet covering. Tricycle or conventional gear, fixed or retracts. Rear or side exhaust, fiber glass canopy. Very positive and maneuverable.



XLT

SPECIFICATIONS:

Wing Span	65 inches
Length	65 inches
Wing Area	845 square inches
Recommended Engine Size	10 cc
	90, or 120 four stroke

The XLT is designed for tuned pipe and retract landing gears. Capable of the A.M.A. or Turn-around pattern. Rear or side exhaust.



UTTER CHAOS

SPECIFICATIONS:

Wing Span	63¼ inches
Wing Area	700 square inches
Engine Size	.50-.60 (Glow)
	.90 four stroke

For fun, sport, pattern, or turn-around, all of these can be done with the Utter Chaos' completely built up Balsa construction. Canopy and engine mount included. Many years of proven flying reliablity.

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AIRWAVES

(Continued from page 8)

an ambitious journey into aero-modeling. Let me qualify that by saying that I've been in the hobby for slightly over two years and, owing to limited time and resources, have barely gone beyond the advanced trainer stage, although I've flown low-wingers with a moderate amount of success. Now for the problem at hand.

I'm designing and drawing plans for a flying boat—a sort of Canadair CL-215. The design is based on the wing from a Great Planes Trainer 60, which should provide plenty of lift and stability. My problem? I intend to build this as a twin-engine bird. With a wingspan of 65 inches, and the rest of the ship "dimensioned" from that, I feel I can safely install two ASP 28F engines for the thrust I need, but I'll also make provisions to upgrade to twin 40s if the need arises. Is the wing, as provided, strong enough to withstand the stress of the engines and 8-ounce fuel tanks, or would it need to be beefed-up? I intend to cap the spars with carbon-fiber strips, but would I also need to replace the balsa spars with hardwood? How about diagonal-grained sheeting from the root to out past the nacelles? Any other help that you can provide would be greatly appreciated.

RICK WITHERS
Goose Creek, SC

Rick, here's some practical advice to help get you started—two ASP 28F engines should provide sufficient power because the synergistic effect of twin engines exceeds the power of a single engine of equivalent displacement. Upgrading to two 40s would probably overpower the plane, given the 65-inch wingspan you're starting with (you want to minimize rebuilds!). I recommend shear webbing between the ribs and out to the tip; possibly lite-ply to the nacelles. Lite-ply doublers on the ribs adjacent to the nacelles are also a good idea. According to Great Planes, a common problem with converting this trainer to a twin is achieving sufficient wing area. Adding a couple of bays at each end of the wing would help.

For a flying boat, you'll also need to get enough height off the water, so you don't quench your engines. (As an alternative to the flying boat approach, Great Planes offers the FL60 float kit designed for the trainer .60.) Be sure to increase the vertical stabilizer and rudder area by about 15 to 20 percent. Adding about 2 degrees outboard thrust to the twin engines will also provide better control should either flame-out. I advise hardwood spars to just outboard of the nacelles and carbon-fiber caps out to the wing tips. Diagonal-grained sheeting will be icing on the cake! *TA*

Help!

I need help! As you know, the research is always done before design and construction begins. Recently, I've been quite taken with a tough little biplane fighter of the late '30s: the Gloster Gladiator—a product of the British Empire. Researching this particular aircraft locally has been very disappointing—the main library had little to offer.

To lay down the lines of the aircraft, I need two views (minimum), specs and any technical information available. With this information, I can do the rest. If you can't supply the requested information, please tell me what sources are available; any suggestions will be appreciated.

MAN is the only model magazine I subscribe to; the others are magazines of historical and present-day real aircraft. Your magazine is outstanding in its field. Keep up the excellent work and I'll stay with it!

JOHN J. TANSEY
Santa Rosa, CA

John, the Gloster Gladiator, described by Jane's Encyclopedia as the "pinnacle of biplane development in Britain," is a heck of an exciting subject! Two sources come to mind immediately: Scale Model Research (2334 Ticonderoga Way, Costa Mesa, CA 92626. Tel. [714] 979-8058) provides photo packs and three-view scale drawings of thousands of aircraft, including the Gladiator. In addition, if you're looking for scale building plans, Bob Holman Plans (P.O. Box 741, San Bernardino, CA 92404. Tel. [714] 885-3959) carries some for this plane. They're drawn by the respected British modeler, Brian Taylor. Accessories like the cowl, spinner and canopy are available. When you've completed this project, send a photo to our "Pilots' Projects" department! TA

Blow Me Away!

I'm 18 years old, but I don't have experience with any R/C planes, or helicopters, etc. I've been interested in getting an R/C heli for many years now, but they were out of my price range. Now that I have a job that pays enough to afford one, I'd like you to recommend a good, beginner collective-pitch R/C heli. There's a problem, though: the average wind speed for Lethbridge is 30.4kph. I need a heli that can take 30 to 40kph winds. Can you help me?

DARCY S. LUTZ
Lethbridge, Alberta, Canada

Darcy, any of today's collective-pitch helicopters can handle windy conditions (10 to 22 knots). One of our heli contributors, Datu Ramel, offers these comments: "A beginner heli pilot, in most cases,

(Continued on page 18)

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PILOT PROJECTS

A LOOK AT WHAT OUR READERS ARE DOING!

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MAN is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable.

All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of 1990. The winner will be chosen from all entries published, so get a photo or two together, plus a brief description and send it in!

Send those pictures to: Pilot Projects, Model Airplane News, 251 Danbury Rd., Wilton, CT 06897.



McGOWAN'S MAGIC...

This Proctor Nieuport 11 flew in from Jackson Center, OH, carrying best regards from Terry McGowan, who has been an R/C enthusiast for 18 years. The plane is powered by an O.S. .91 Surpass 4-stroke with a Perry micro-oscillating fuel pump and a World Engines EGAS glow-plug drive. McGowan scratch-built the complete cockpit and instruments. It's covered with Solartex, followed by a clear polyurethane overcoat, and its markings are hand-painted. With its 61-inch wingspan, this plane's performance is no trick!

96 MODELS IN 35 YEARS



Senji Watanabe (Japan) started reading *MAN* 48 years ago, and over the last 35 years, he has built 96 R/C planes. Now his interests have turned to giant scale, and his accomplishments include a 1/3-scale Pitts Special and a 1/3-scale Christen Eagle. This 2/5-scale BD-5J is a real beauty; it's powered by a Rossi 90DF engine, and it uses a Byrojet fan unit and a Futaba 9-channel PCM radio. All three have flown nicely. What's next, Mr. Watanabe?

WHAT'S UP, DOC?

According to Mont Jay Cartwright, M.D. (Ann Arbor, MI), what's up is this Byron F86 Sabre Jet, and it's wearing the latest in camouflage colors and rub-on rivets! This 9 1/2-pound plane is powered by a Rossi .90 with in-flight mixture. The good doctor operates with a Futaba FP-7UAF radio and uses Rhom retracts. The finish is 07 fiberglass cloth, Pic Epoxy Resin and K&B Primer. This plane is just what the doctor ordered!



HAWAIIAN HANDIWORK!



These bright birds *won't* be migrating to the shelf for winter! Built from *MAN* plans, these colorful trainers are the handiwork of Ed Starling of Honolulu and Dan Sinclair of Kailua, HI. Dan modified a single-ducted version to come up with his 3-channel double-ducted design. Powered by two .049 Black Widows, "synchronizing problems" have prevented it from flying, and everyone is waiting for Dan to install "two TDs .049s fed from a single tank!"Ed powers his sharp-looking, streamlined, pink-and-white trainer with a Cox .051. He added a third channel because he throttle for touch-and-go's, and to make the canopy, he cut the front end off a standard one from Sig and then needed reversed it. A pilot completes this perfect picture.

STUPENDOUS STEARMAN

What can modelers do in the cold, dreary months of December and January? Donald Forte (of Mashpee, MA) scratch-built this bright 1/5-scale PT Stearman from Nick Ziroli plans! It has a 77-inch wingspan, weighs 22 pounds, and is powered by an O.S. FR5 300 radial engine with an on-board driver. Covered with Super Coverite and painted with Hobby Poxy, the plane looks terrific (it even has a detailed cockpit), and, with a Futaba 7 UAP, it handles well, too. The pilot's white scarf must really start flapping when this beauty takes wing. That's some winter project!





IMPRESSIVE PUP

Donnie McEntyre (Moreno Valley, CA) built this 1917 Sopwith Pup from a Balsa USA kit. Finished with Coverite and polyurethane paint, it weighs 27 pounds and has a 9-foot wingspan. Donnie reports that the O.S.-300 5-cylinder radial engine sounds pretty authentic and that the judges get a kick out of the pilot, whose head turns from side to side. This super Sopwith placed 7th in the Scale Masters Qualifiers in Fountain Valley, CA., and Donnie says he's very proud of his plane. He should be!



AEROBATIC ELECTRIC!

If you're in Madison, AL, look out for this beauty—and you'll see it before you hear it, 'cause it's an electric! Made by Glenn Baeske, it's an Astro Flight P-68 powered by 14 800Ma cells through a Jomar SM-4 speed control to twin Astro Cobalt 5s. With a 48.5-inch wingspan, this 6 1/2-pounder flies at full power between 2 1/2 and 3 minutes on a charge. Super MonoKote provides a great finish (with a little help from Glenn!), and the 7x5 props are by Rev-Up. This aerobatic model does "good loops and rolls and will even fly inverted." We got a charge out of this one!

AAAGGHH, ALIENS!

Unsuspecting Tim Foole (of Manchester, NH) was quietly building a Tiporare from Great Planes when the model began to take on a life of its own. Tim's brother (the artist) pointed out that the mutation was starting to resemble the monster in the movie "Alien." Tim couldn't resist the power of the cosmos, so he "went with the flow," and now his creepy creature really "eats up the sky"!



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AIRWAVES

(Continued from page 15)

is someone who flies or hovers only into the wind. Congratulations to Darcy, because just a few years ago, if you wanted to learn in a windy region, you might have been advised to take up checkers!

"There are two situations in which the wind causes problems. The first is learning to hover close to the ground—variations in wind speed between gusts can cause unwanted altitude changes. To solve this, you need a helicopter that allows you to adjust its collective-pitch sensitivity to match the conditions. The second is when you're hovering or flying above eye level, and the wind is providing all that free lift. Now, the problem is getting the helicopter to come down! To solve this, you need to be able to adjust the descending pitch (or negative pitch) to match the wind conditions. Both of these methods are available to anyone who buys a commercially available collective-pitch helicopter.

"The response or feel of the rotor-head system is more important for building your confidence in windy conditions than the helicopter's mass. For example, a 30-size DDF (dual-damp flapping) or single-axle-head design is easier to hover in wind than the early 60-size helicopters with "teetering-head" designs. When compared with stock set-up instructions, all that most helicopters need to handle windy conditions is more throw at the cyclic servos, additional weights on the flybar and more negative pitch.

"Take time to learn windy set-ups from experienced pilots, and try not to anguish over the equipment decision! Buy a helicopter that's flown in your area so that you can get help, and consider the cost of repairs and availability of spare parts." TA ■

FIFTY YEARS AGO

WOULD THE U.S. BE READY FOR WAR?

by BRENDA J. CASEY



The XB-19 never came out from behind closed doors!

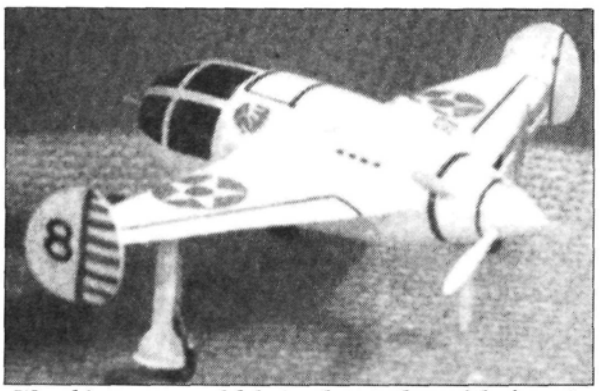
WHAT WAS BEING built in 1940, in the largest, single-arch structure of the 20th century (a huge hangar in Santa Monica, CA)? The largest plane ever, of course! *MAN* dug up the details for a cover story on the Douglas XB-19 four-engine, all-metal bomber. Why all the security (you needed a badge to enter the building's single door), secrecy and rumor surrounding the Army's "Project D"? The plane had a conventional outline, construction and performance; only its size was unusual. It weighed nearly 70 tons; it had a 212-foot wingspan (twice that of Boeing's B-17C, the Flying Fortress); it was 132 feet long; and its fin was four stories high!

There were engineering challenges with a plane this size. It needed the largest pnudraulic shock strut and hydraulic pump ever designed, and they thought it would require six engines, but four, huge, experimental Wright engines did the job. There was much controversy over whether bigger was better. After all, this plane was expensive and vulnerable to anti-aircraft guns because of its size and slowness (200mph). Although it had a projected range of 7,000 miles, the XB-19 never had a chance to prove its worth; the U.S. entered WW II in 1941, and it was never put into production.

STEEL NOSES AND COLD FRONTS?!

Engineers continued to fine-tune their designs to make their structures better able to withstand an enemy "hit" and to provide more protection for the crew. They experimented with aluminum shielding and steel plating and tested new Neoprene rubber fuel lines that wouldn't leak if pierced by bullets. Teardrop-shaped glass gun turrets were becoming obsolete (an unfortunate development for detail-loving modelers). Crews would soon be able to operate the guns by remote control from deep inside the fuselage, using a system of mirrors as their gunsights.

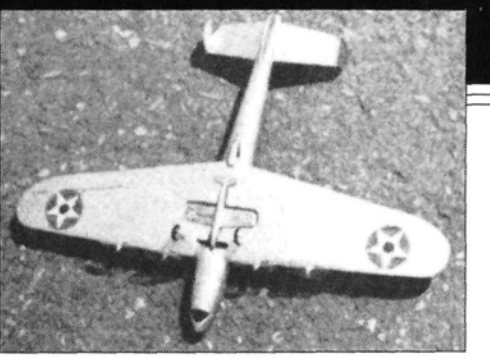
It seems that the U.S. hadn't anticipated every aspect of war. Weather forecasting played such a big part in Hitler's successful blitzkrieg tactics that 50 Army Air Corps officers were sent to Caltech's Meteorological School! The Civilian Pilot Training program set up by the Civil Aeronautics Board was to provide preliminary training to 45,000 pilots by July 1941. Though its goal wasn't explicitly to build our defense reserves, Uncle Sam paid the students' tuition at aviation clubs and colleges throughout the country.



Was this stumpy model design the warplane of the future?

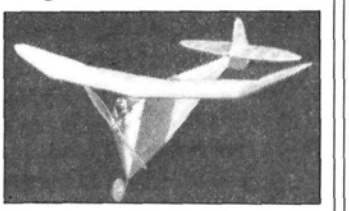
TOMORROW'S FIGHTER-BOMBERS?

Even modelers were designing the warplanes of the future. "Air Ways" featured one of the winners of the original design contest at the Sky Blazers Expo, which was held at the NY World's Fair. Mr. Pogthress (of Brooklyn, NY) created a unique bomber that carried a little pursuit plane in a recess in its belly. As the immense bomber flew over its target, the pursuit would be released to fend off enemy attacks!



A little pursuit plane hitches a ride on this giant bomber!

Leonard Malott (of Marion, OH) won *MAN*'s Originality Contest (and $5!) for his tail-less fighter—an interceptor-pursuit. Designers were experimenting with a full-size version; if it were stable (and the wings were sufficiently swept back and had an extreme negative angle of incidence at the tips), this could make an ideal military plane!



The winning Wedgy—funny-looking, but a fine flier.

If you were into building, the 1940 issue of *MAN* contained the instructions and plans for making the Profile Playboy, the Messerschmitt Me-109 pursuit, or the winner in Class A at the '40 Nationals (with a 22-minute flight)—the Wedgy. This plane was very easy to build,

(Continued on page 49)

SMALL STEPS

by RANDY RANDOLPH

The Cox TD .010 is back, and can you recognize an old beauty? No prizes!

BECAUSE OF requests (really, there were two!) to see what the fellows who write this column look like, this month, I show a picture of us. AMA District VIII Vice President, Gene Hempel, referees the discussion between Joe Wagner (center) and poor me (right) (whom Joe calls the "Conservative Iconoclast") at the 2nd Annual Small Steps Fly-In held last fall in Dallas, TX.

Gene Hempel is a true expert on small engines. He holds several patents for 2-stroke designs and can get more performance out of .049s than anyone! It's good to have someone on the AMA Council who understands that you don't need big airplanes to have big fun!



Here's a foam with a sticky back—heck of an idea!

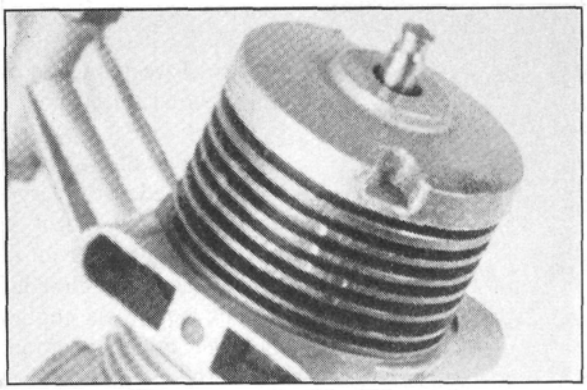
THE RETURN OF THE .010

By now, many people are aware that Cox* will, once again, produce the TD .010 engine. There were only two .010-powered airplanes at last year's SS Fly-In, but that number should increase markedly by this year's event. For this engine, a 6- or 7-ounce airplane with over 100 square inches of wing area is a good machine. Futaba* and Cannon* have the necessary lightweight radio equipment to keep the finished aircraft well within the design weight limit. Which builder will be the first with a ducted-fan airplane for the .010?

BE FRUITFUL AND "MULTI-FLY"?

Look at the photo of the inside of one of Steve Hart's beautiful airplanes. The battery pack is made up of 150mAh Radio Shack cells, which Steve highly recommends because he's had excellent results with them. They're inexpensive, light and almost universally available—a very good combination!

Steve and his flying buddy, Tom Day, are creative and prolific builders. Between them, they bring 10 or more airplanes to every fly-in, and they usually have several new ones. It's a good thing they like little airplanes or they'd need a moving van for trips to the field!



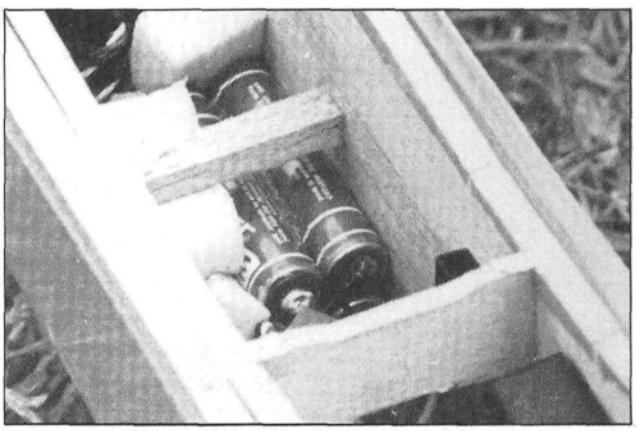
Do you recognize this old beauty?

SHOPPING TIPS

Like the Radio Shack batteries, many things originally intended for other uses can be adapted to our sport. Fabric stores, hardware stores and office-supply stores are excellent places in which to browse for these items.

Fabric stores have great selections of French-type curves, small hardware, monofilament thread and tools like rotary cutters and seam rippers, both of which work well on covering material. You can buy all kinds of tools at any hardware store: O-rings (for tires), fasteners, adhesives and paints. The larger office-supply stores are full of useful "goodies."

The "goody" shown in the picture is a genuine "find" from Air Kraft*. Super Foam is an adhesive-backed foam that eliminates the need to fight with tape when making battery packs, or wrapping receivers. You can use it on the parts, or line the airplane's battery/receiver compart-



Steve Hart found an answer to the need for a light battery pack.

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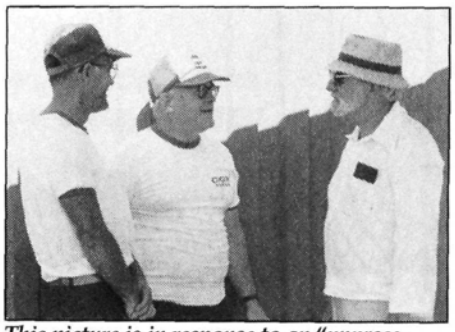
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SMALL STEPS



This picture is in response to an "unprecedented" demand from the modeling public!

ment and snuggle the equipment into a foam nest. It works well in the tank area, and you can even slice it into thin strips that are good for sealing wing saddles. It's good stuff—something that should have been thought of a long time ago!

OLD FRIENDS!

Ace R/C* has always been a good friend of small airplane lovers. In fact, for a very long time, it was almost the only source of many of the things that made 1/2A R/C airplanes practical. It's nice to know that there are still companies like Ace that care about service and quality. I ordered a small battery pack from them, and it was delivered within *four* days of my placing the order—*during the week before Christmas!*

The last picture is a test for semi-old-timers. There won't be any prizes or awards for those who recognize it, but I'll give full credit here to the first 10 people who name this old smoker!

I wonder just how many different .049 engines have been manufactured in the U.S. since WW II? I'll check with Joe; he's a walking model-aviation history book—he'll know!

**Here are the addresses of the manufacturers mentioned in this article:*
***Cox Hobbies, Inc.,** 350 W. Rincon St., Corona, CA 91720.*
***Futaba Corp. of America,** 4 Studebaker, Irvine, CA 92718.*
***Cannon R/C Systems,** 2828 Cochran St., Simi Valley, CA 93065.*
***Air Kraft,** 4104 Lark Lane, Houston, TX 77025.*
***Ace R/C,** P.O. Box 51, Higginsville, MO 64037.* ■

HOW TO:

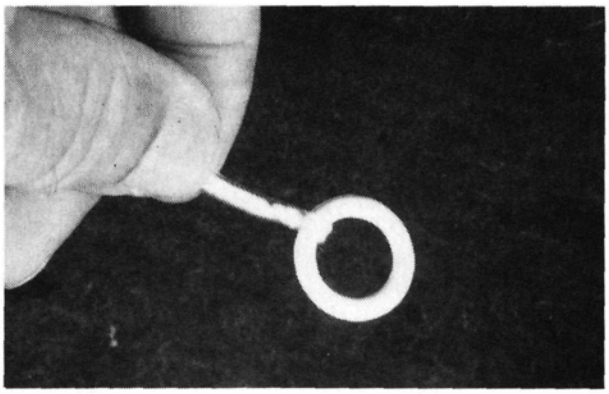
by RANDY RANDOLPH

MAKE A SMALL HI-START

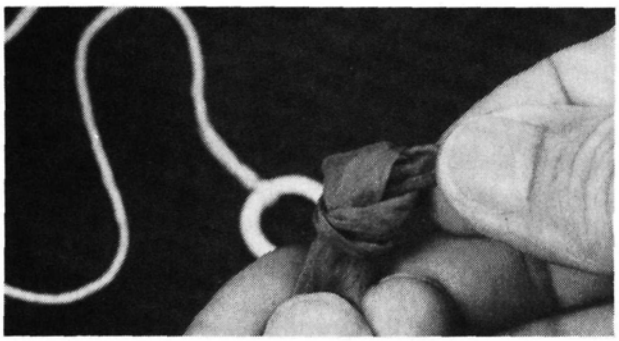
There are many kits available for hand-launched R/C sailplanes. They offer good performance and the convenience of flying off small, fields like parking lots, sport fields and school grounds. Since few of us are blessed with an arm like Nolan Ryan's, we welcome alternative launching methods. Here's how to build a small inexpensive hi-start that can substitute for a sore arm.



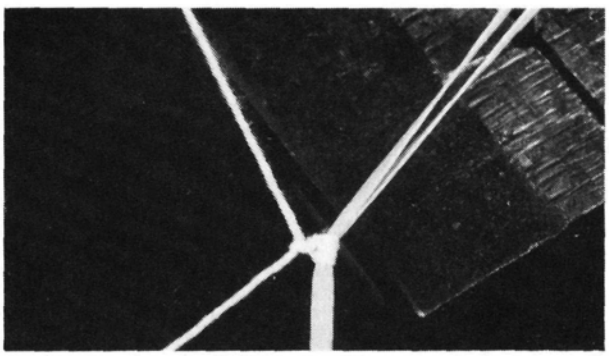
1. *The required materials are: 25 feet of 1/4-inch rubber, 100 feet of good-quality kite string; a 1-inch plastic ring; a small piece of colored silk and some fuel tubing.*



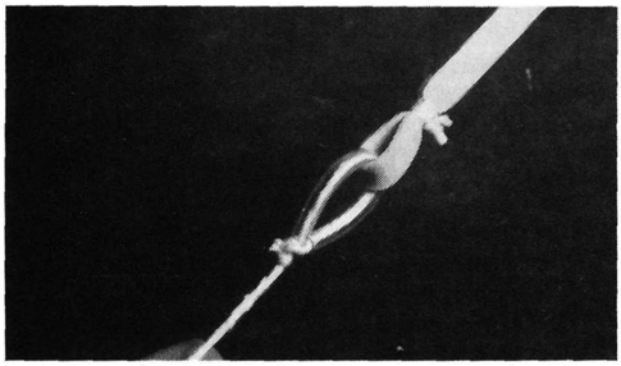
2. *You can buy packages of plastic rings in fabric stores for less than $1. Run a double turn of string through the ring and secure the knot with a drop of Hot Stuff.*



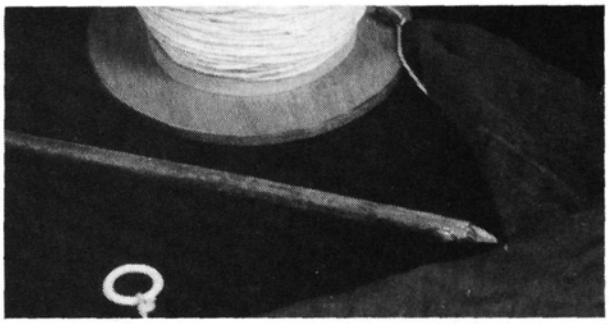
3. *Tie an overhand knot in one corner of the silk so it won't slip. Tie the silk "streamer" 6 inches below the ring, using an overhand knot in the string. The streamer will help the ring to slip away from the tow hook at the top of the launch.*



4. *To tie a loop in the 1/4-inch rubber, stretch the loop and wrap it with two turns of string. Pull the string tight, tie a firm knot, and then trim its ends. Repeat this on the other end of the rubber.*



5. *Slip the free end of the string through a 2-inch piece of fuel tubing, and then slip this through one of the loops in the rubber. Tie a knot against the tubing, secure it with Hot Stuff and trim the loose ends. Repeat for the other end of the rubber, using 2 feet of string.*



6. *The reel is made of two 6-inch discs of 1/8-inch plywood mounted on each side of a piece made by cutting through a 2x4 with a 2-inch hole saw. A 12-inch tent peg serves as the anchor. In practice, the short piece of string is tied around the reel and the reel anchored to the ground with the tent peg through a hole in its center. Unreel the hi-start by holding the launch ring and walking downwind.*

KIT-BASHING!



From Aero-Star to Terror Trainer, page 36

Who can resist dressing up a plane or "tweaking" its design to improve scale realism, enhance flying performance, or just make it shine? Starting with an overview by master kit-basher Faye Stilley, this "kit-bashing" section is devoted to the excitement of changing what was into what can be.



The Optimized Electric, Part I, page 42



Ace Bipe Becomes a Curtiss P-6E Hawk, page 38





Confessions of a Master Kit-Basher, page 30



Dress Up the Dynaflite Fun 51, page 33

KIT-BASHING!



■ *Left: The author says he didn't have stars in his eyes—just "Star Wars" in his head—when he bashed his Sig Kadet into Darth Vader.* ■ *Below: Balsa USA Enforcer turned Enforcerus awaits any challenge. "Thrusters" in the wing sport variable-speed strobe lights.*

CONFESSIONS OF A MASTER KIT-BASHER



by FAYE STILLEY

NO MATTER what you call it—"kit bashing" or "customizing"—it's always enjoyable and rewarding. When you take your creation to the field, you'll hear "What is it?" and "Is that a kit?"—even though the people asking have probably seen the kit version many times or have even built one. I confess! I'm an incorrigible kit-basher!



With just a MonoKote dress-up, even the Mini Master can look mean!

★ ★ ★



This Sig Kadet Jr. wears a MonoKote disguise to simulate a Cessna.

★ ★ ★

CAREFREE KIT CONVERSION

If you're thinking that you aren't a designer or an aeronautical engineer, don't worry—the kit designers *are*. They work out all the details—flying- and control-surface areas, dihedral, incidence, thrust lines, moments, airfoil design, engine thrusts and all that complicated stuff! Their efforts leave the rest of us free to be creative with a plane that we *know* will fly. Advanced fliers might fool around with the design fundamentals because they want to change a plane's flying characteristics, but, by kit-bashing, you can build your own design and still be confident that you haven't ruined its engineering.



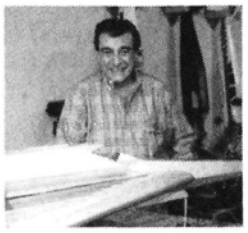
In its transmutation from a Pacific Aire Showbird flying wing into the Unitar, the 'Bird's vertical fin was bashed and its wing planform modified.



■ *Above: Andrews Sport Master bashed into a Messerschmitt with color changes and minor alterations to cockpit, rudder, fin and cowling.* ■ *Left: Canopy was moved aft and vertical fin reshaped before this Great Planes Super Sportster 60 was dressed up as a MiG.*



A 1st- and 2nd-place winner at Toledo and WRAM shares his techniques–and the excitement!



What will the "master" produce next?!

The easiest way to customize is to change a plane's color scheme. If you don't like the colors shown on the box, change the plane's appearance by giving it a "scale-like" scheme. A high-wing kit can become a Cub, a Cessna, an Aeronca, or one of many others; a low-wing plane can easily be transformed into a WW II military ship. These changes in finish even seem to change the apparent *shape* of the aircraft.

Further, with minor balsa changes, a Taube can become a chicken-wing or a gull-wing, and a simple sportster can be converted into a Batplane—or something equally weird!

DESIGN OPTIONS

If you're more adventurous, you can make *major* changes to your plane's appearance by making *minor* changes to its basic design. You can achieve a totally new look just by changing the fuselage, and, without altering the flying characteristics, you can modify:

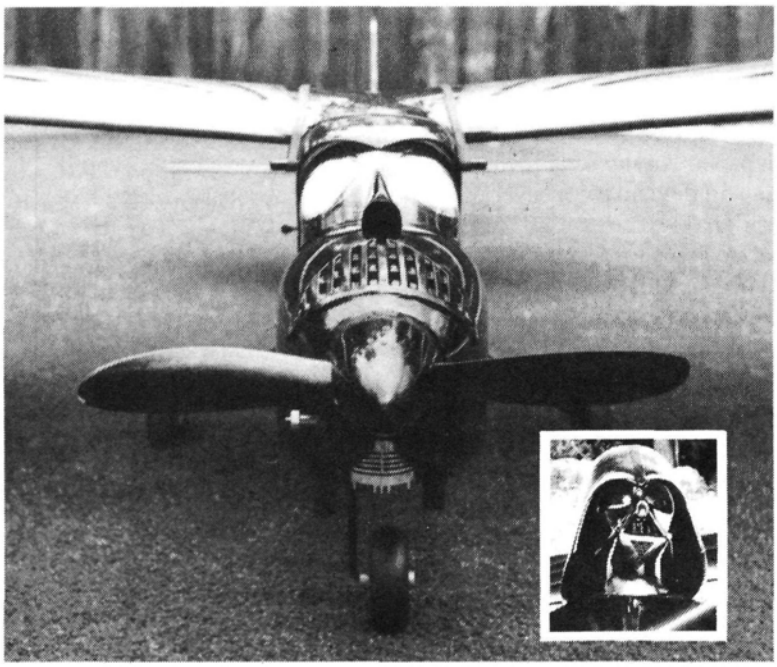
- fuselage profile
- cockpit
- cowl
- landing gear

You can add:

- antenna posts
- exhaust stacks
- machine guns
- emblems/numbers
- panel lines—etc., etc., etc.!

You can modify the shape of the fin and rudder, but be sure to maintain the surface area to avoid altering the plane's flying characteristics.

Looking for ideas? —magazines are full of them. Zenith publishes many books,



Which Darth Vader has the prettier smile?

SPECIFICATIONS

SIG KADET JR. TURNED CESSNA

Wingspan: 48 inches
Weight: 2 pounds, 14 ounces
Wing Area: 430 square inches
Wing Loading: 15.4 ounces per square foot
Power: Super Tigre .25; Zinger 8x6 propeller
No. of Channels Req'd: 3

ANDREWS MINI MASTER TURNED MESSERSCHMITT

Wingspan: 48 inches
Weight: 3 pounds, 8 ounces
Wing Area: 416 square inches
Wing Loading: 19.4 ounces per square foot
Power: O.S. .26; Master Airscrew 8x6 propeller
No. of Channels Req'd: 4

SIG KADET TURNED DARTH VADER

Wingspan: 48 inches
Weight: 4 pounds, 8 inches
Wing Area: 635 square inches
Wing Loading: 16.4 ounces per squaqre foot
Power: Enya .40; Master Airscrew 10x6 prop
No. of Channels Req'd: 4

BALSA USA ENFORCER TURNED ENFORCERUS

Wingspan: 49 inches
Weight: 6 pounds, 4 ounces
Wing Area: 930 square inches
Wing Loading: 15.5 ounces per square foot
Power: Saito .90 twin 4-stroke
No. of Channels Req'd: 5

PACIFIC AIRE SHOWBIRD TURNED UNITAR

Wingspan: 66 inches
Weight: 6 pounds
Wing Area: 800 square inches
Wing Loading: 17.3 ounces per square foot
Power: Enya .40; Master Airscrew 10x6 prop
No. of Channels Req'd: 4

GREAT PLANES SUPER SPORTSTER 60 TURNED MiG

Wingspan: 61 inches
Weight: 6 pounds, 4 ounces
Wing Area: 675 square inches
Wing Loading: 21.3 ounces per square foot
Power: Saito .90 twin 4-stroke; Zinger 14x8 prop
No. of Channels Req'd: 4

ANDREWS SPORT MASTER TURNED MESSERSCHMITT

Wingspan: 65 inches
Weight: 6 pounds
Wing Area: 715 square inches
Wing Loading: 19.6 ounces per square foot
Power: Enya .60 Schnuerle with tuned pipe; Master Airscrew 12x6 prop
No. of Channels Req'd: 4

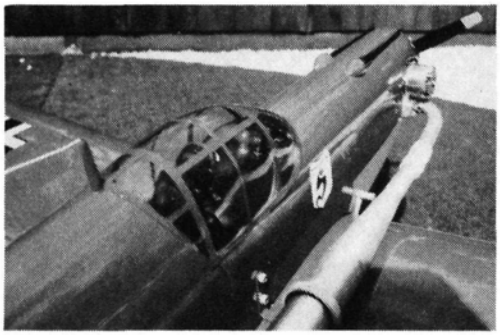
CONFESSIONS OF A MASTER KIT-BASHER



The details on the Unitar are unbelievable—from the flush rivets to the pilot's horn.

including my favorite, "Flying Colors," which is primarily military, but full of interesting color schemes.

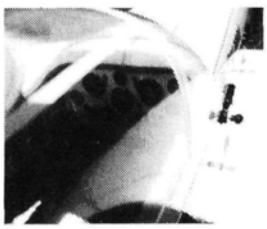
If you decide to chop a little balsa, here's the easiest way to do it. If you already have a kit, you can "design" around it; if not, you can play around with a design and then buy a kit that fits your design.



It started as a Sport Master, but now a detailed cockpit and guns add to the Messerschmitt's mean look.

★ ★ ★

Concentrate on the fuselage! Most sport kits have fuselages that look uninteresting, and many don't even have cockpits. It's almost as if the designers just want a place to hang the engine and something to connect the tail to the wing. Mess around with the fuselage profile as much as you want, and when you have a shape you like, use colored pencils to plan a color scheme. If you have a wild one in mind, try it out on the wing, because that's the largest surface. Then complement the wing by transferring any part of the design that will fit onto the fuselage and tail surfaces.



MiG is done in authentic winter colors, with "Hail Stalin" written in Russian on the side of the fuse.

★ ★ ★

DRAW A SCALE THREE-VIEW

Having worked out the design, transfer it to the plans by drawing a scale three-view of the kit plans. The easiest scale is 1/4 inch to 1 inch, but it probably won't fit on regular 8 1/2x11-inch paper. Any scale will do, and it doesn't have to be accurate down to 1/16 inch because that will come when you draw your design onto the kit plans.

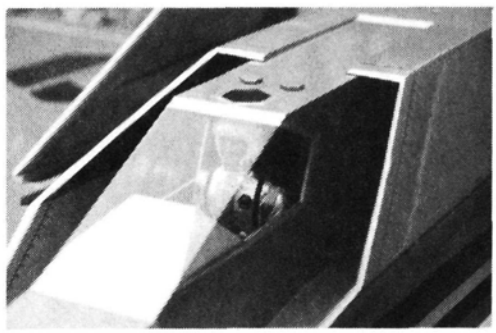
"Most sport kits have fuselages that look uninteresting, and many don't even have cockpits."

★ ★ ★

Don't draw directly onto your kit's plans, and don't use a pen. Use tracing paper to cover the area of the plan you want to modify. Then transfer your small-scale drawing to the scale of the kit. (You'll probably have to make minor changes to adjust for major kit formers, the firewall, the fuel-tank location, etc.)

CONSTRUCTION TIPS

Decide where you'll put formers in the new profile and draw them on the side view. Mark their locations on the top view. You now have height and width measurements for your new formers. As far as shaping contours is concerned, just do whatever pleases you.



Enforcerus pilot started as a Ken doll! Cockpit includes a back-lit instrument panel.

★ ★ ★

It's surprising that, even with major changes in shape, most of the wood and many of the precut formers can be used to make new formers for your own design. Only when you make things larger will you have to go to your balsa scrap box for supplies.

The cowl almost always takes a little extra wood. Kits without a plastic cowl are designed to have the engine exposed, but engines aren't big, so you'll probably have enough scrap to make a cowl.

If you add weight in front of the CG, e.g., a fancy cowl, you'll probably want to move your servos and battery aft from the location shown on the plan, and forward if you add weight behind the CG.

(Continued on page 49)

KIT-BASHING!

by STAN RUTZ

Dress up the Dynaflite Fun 51!

The quick-build Fun 51 becomes a "Fun Cavalier"—with looks that match its exceptional performance.

AS THE ONLY modeler in the world who has never built—or even *wanted* to build—a Mustang, I was caught off guard by Dynaflite's* invitation to "Pick it up; it's light" at the Toledo show last year. The company was referring to its recently re-engineered Fun 51. I had seen the original version fly, and although I liked its performance, I disliked its looks. The new one was better looking, and the kit contained good hardware, a fine canopy and high-quality, cleanly die-cut wood. I bought it on impulse, with no intention of building it myself.

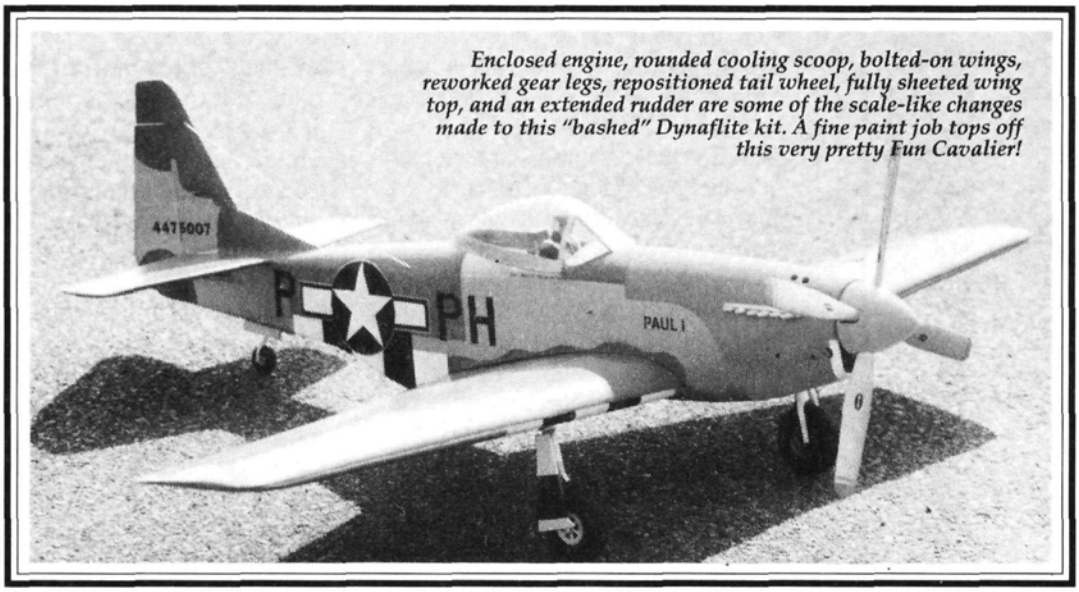
After I had spent an hour with Paul Poberezny's full-size Cavalier in the EAA maintenance hangar at Oshkosh, my plans changed! The Cavalier is a luxurious two-place conversion of a P-51D, which is easily recognized by its extended canopy and P-51H vertical fin. Filled with enthusiasm, I pushed everything else aside and set about turning my Fun 51 kit into a Fun Cavalier!

SAME AS SCALE?

Taking a quick inventory of the kit, I found all the parts except the mysterious part no. FPS138, which I had to do without. The 11-page instruction book accompanying the plans promised that, "With a little imagination and some extra work, it can look remarkably like a scale model"—exactly my intentions!

Some things had to go:
—straight leading edges (even Fun 51 wings need a kink at the landing gear)
—wings held on with rubber bands (What can I say?)
—exposed engine (the top line of a Mustang's nose is an art form!)
—aft tail wheel (another fine line ruined!)
—wing ribs (they shouldn't show)
—square scoop and blunt wing tips (easy to fix)
—outboard landing-gear strut (a disguise!)

I knew I had to rid the plane of these, but without complicating what was meant to be a "quick-build" project.



Enclosed engine, rounded cooling scoop, bolted-on wings, reworked gear legs, repositioned tail wheel, fully sheeted wing top, and an extended rudder are some of the scale-like changes made to this "bashed" Dynaflite kit. A fine paint job tops off this very pretty Fun Cavalier!

SPECIFICATIONS

Type: *Fun scale*
Span: *52 inches (50 inches)*
Weight: *5.25 pounds (4.5 to 5 pounds)*
Wing Area: *500 square inches (493 square inches)*
Wing Loading: *24 ounces per square foot (22 ounces per square foot)*
Power: *35 Enya 2-stroke; 11x7.5 Master Airscrew propeller*
Construction: *Balsa and film*
No. of Channels Req'd: *4 (elevator, ailerons, rudder and throttle)*

**** original kit's specs in parentheses***

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CARLSON ENGINE IMPORTS
814 East Marconi, Phoenix, AZ 85022

Dress up the Dynaflite Fun 51!

I drew a new leading edge on the wing plan, connecting the full ribs at the fuselage and the wing tip to a 3/8-inch foreshortened rib at the landing gear. I deepened the ribs' vee notches and reshaped the leading edges accordingly, moved the gear blocks aft 3/8 inch and added a wing-mount dowel to the center rib. I cut and rejoined the leading edges at the gear rib.

The top of the Fun 51 wing has a sheeted center section and leading edge, and there are capstrips aft of the spar, so it's easy to sheet the entire top. I also chose to reduce the wing's dihedral and sheet its bottom back to the main spar. For a more graceful taper, I extended the wing-tip blocks 1 inch.

The fuselage fell together beautifully. I reinforced the front of the wing well, drilled it for the wing dowel and, to eliminate the need for rubber bands, I mounted a Du-Bro* wing-bolt set at its rear. I bent a new tail-wheel strut with a triangular base, sandwiched it between two triangles of hard balsa and, using CA, glued it into place, 5 inches in front of the location shown on the plan.

I mounted an Enya* 35 on 8-inch hardwood bearers, and installed it inverted, by the cut-and-try method. As a thrust-line reference, I used the slots meant for the mount supplied with the kit. I then built the top of the nose—without a hatch. The hole I cut in the bottom blocks for the cylinder head is optional, because the engine fits inside the bottom line, and there was even room for a cooling-air exit tunnel.

The engine can be removed through the hole and under-spinner scoop behind the 3-inch spinner, so I don't need hatches. Access holes are needed to reach the engine and muffler socket-head mounting bolts, but they aren't unsightly. The muffler lies perfectly along the nose, and the balsa dummy rocker covers and exhaust stacks were worth the effort.

I extended the vertical fin—P-51H style—and I sheeted both the fin and the top of the horizontal stab with balsa. To strengthen the wing in the area of the wing bolts, I glued on a plywood disc. The box-like cooling scoop was assembled with the square front former trimmed to an oval. When I bent the side pieces around this oval, a scale-like gap between the wing and scoop appeared. I then cut a wing-bolt access hole in the bottom of the box.

I covered everything except the ailerons with polyester chiffon (model Ceconite) and several coats of Sig* clear dope, followed by silver Aero-Gloss*.

At first, I was baffled by the color scheme on Paul Poberezny's Cavalier ("Paul 1"—the plane that inspired me to start this project), and then I realized it was a copy of the one seen on the Lou IV in the famous picture of four Mustangs flying in formation above the clouds (see Mason's "Aircraft of World War II"). I happily set about duplicating it with brushed-on Aero-Gloss.

I hammered an old TV antenna to make the fake gear legs; then I bent it to shape, drilled it to fit the real axle and cut it to snap onto the top of the real gear leg. I removed the pilot-head armor, installed a red leather seat top, and drilled a scale antenna exit on the starboard side behind the canopy.

FUN FLYING

I carved a Hamilton Standard four-blade prop from two 13 1/2-inch balsa blocks, crossed them on a 3-inch plywood circle and fitted a spinner, which I trimmed from the plastic packaging on the Goldberg spinner. A little dope, and it became an inexpensive, pretty exhibition prop.

Weighing 5 pounds, the plane is faster than the Fun 51, and it does horizon-to-horizon rolls without wobbling. Dead-stick glides are fast and flat with solid control through touchdown and, even with the fixed tail wheel, ground handling (on grass) is excellent. It's strong enough to withstand prangs with little damage, but it looks good enough to place in regional scale competition—and I still haven't built a Mustang; or have I?

Here are the addresses of the companies mentioned in this article:
***Dynaflite,** 1578 Osage, San Marcos, CA 92069.*
***Du-Bro Products,** 480 Bonner Rd., Wauconda, IL 60084.*
***Enya Model Engines/Altech,** P.O. Box 286, Fords, NJ 08863.*
***Sig Manufacturing Co.,** 401 S. Front St., Montezuma, IA 50171.*
***Aero-Gloss; Pactra/Plasti-Kote Co.,** 1000 Lake Rd., Medina, OH 44256.* ■

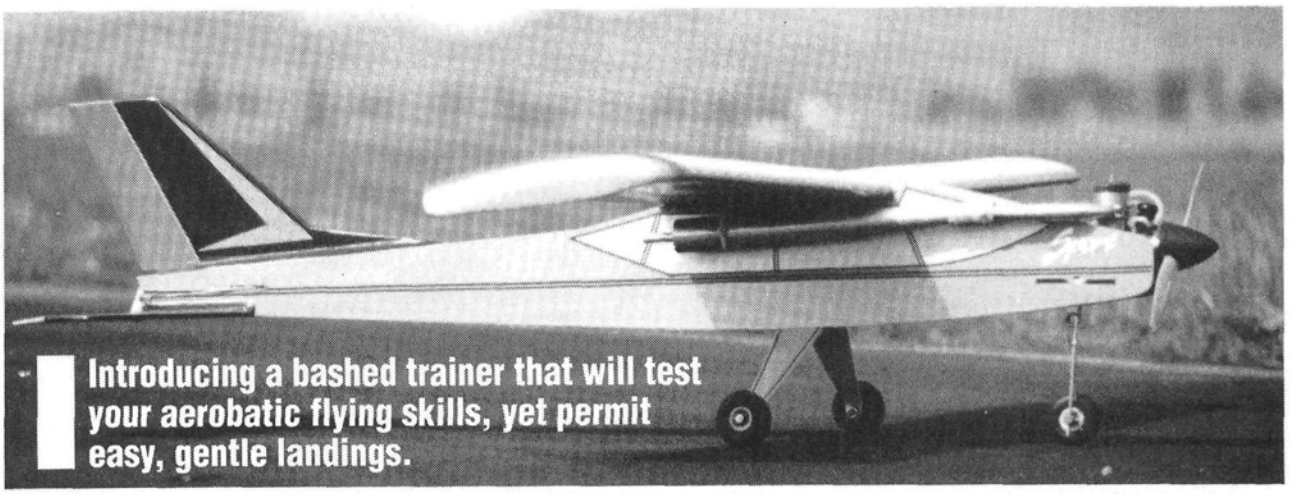
KIT-BASHING!



"The performance envelope went from being like a reliable postcard to a Federal Express overnight package in a hurry."

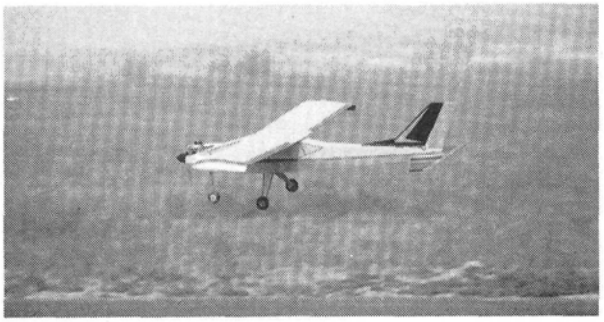
From Aero-Star to TERROR TRAINER

by BOB AND EARL CARPENTER



Introducing a bashed trainer that will test your aerobatic flying skills, yet permit easy, gentle landings.

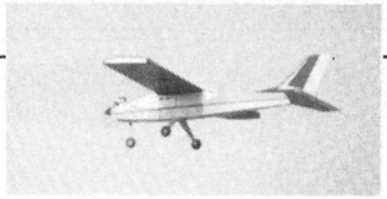
When it's time to slow things down for a landing, the stable characteristics of the modified Aero-Star come into play.



OBVIOUSLY, TRAINERS must incorporate many features in order to make basic flying easy, but these same features limit an airplane's performance. Eventually, beginner pilots outgrow their trainers and graduate to intermediate levels, but taking the step to an advanced plane can be intimidating. The typical low-wing aerobatic plane that's often recommended as a successor usually comes with a much higher stall speed, touchier controls and no built-in self-recovery.

Midwest's* Aero-Star has been on the market for about three years, and it has quickly gained a reputation as an excellent first airplane. It possesses every trait that a trainer should have: 3 inches of dihedral to ensure straight flight; a tricycle landing gear for excellent steering control on takeoff; and a flat-bottom wing that's easy to build. All this, combined with a complete, easy-to-understand instruction manual, sets the Aero-Star apart from the rest of the pack.

Two years of practice with the Aero-Star left us longing for inverted flight, outside loops and other tricks. The problem was that we weren't ready to give up gentle landings and slow, stable flying characteristics, and the gap between trainer and terror was just too much for us. Our search for the perfect kit to



bridge that gap left us empty-handed, but after a few nights in the shop tinkering with our well-used Aero-Star .40, we think we've found the solution.

LET THE BASHING BEGIN

First, we eliminated most of the dihedral by cutting it down to 3/4 of an inch. To maintain maximum stability at slower speeds, drooped Horner wing tips were added. We kept the flat-bottom wing design because it was simple to build, and we wanted to retain a healthy amount of lift.

We needed to make the controls more responsive, and, although we used the quickest setting on the ailerons, the other controls required more work. About 1/3 more width (3/8 inch) was added to the elevator, and a full inch was tacked onto the rudder. In addition, the controls were hooked up for maximum throw. To keep the back of the tail feathers lined up, we moved the vertical stabilizer forward 1 inch.

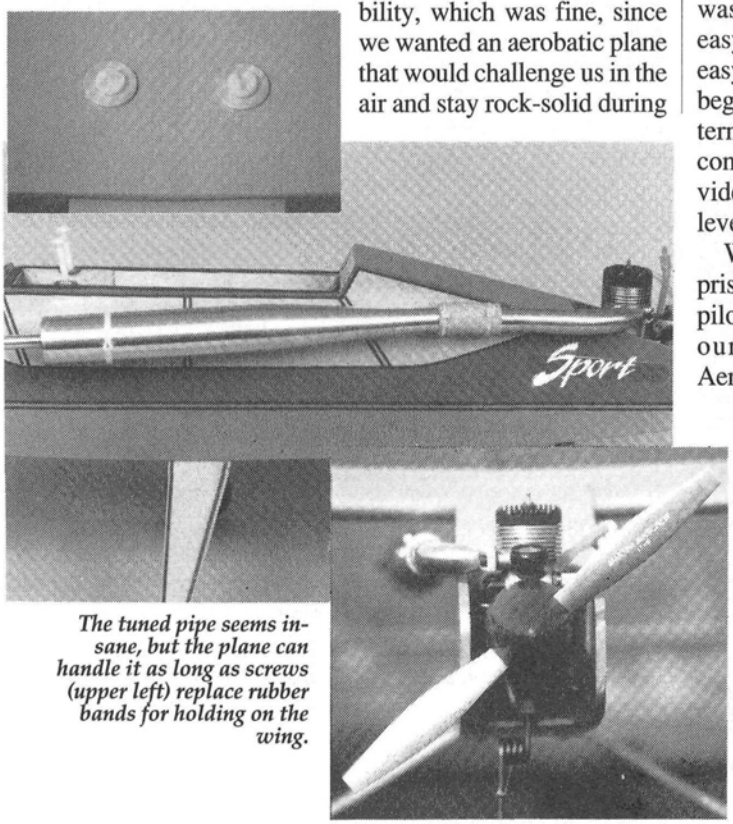
At this point, the Aero Star's aerobatic capabilities had progressed beyond those of a trainer. To take full advantage of our new concept, we installed a Futaba* YS45 pumper engine—a fine example of precision engineering. It always starts easily, idles perfectly and pulls hard throughout the power band.

Once we were comfortable with the new performance boundaries, we went off the deep end and installed a Mac's* header and tuned pipe. At this point, just about the only Aero-Star characteristic left was slow speed stability, which was fine, since we wanted an aerobatic plane that would challenge us in the air and stay rock-solid during takeoffs and landings. To say that we ended up with a completely different airplane would be an understatement. The performance envelope went from a reliable postcard to a Federal Express overnight package!

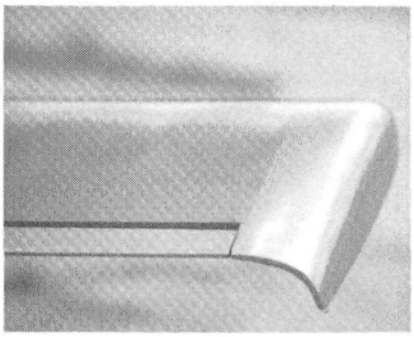
"We wanted a plane to bridge the gap between trainer and fully aerobatic sport plane. We think we've met the objective."

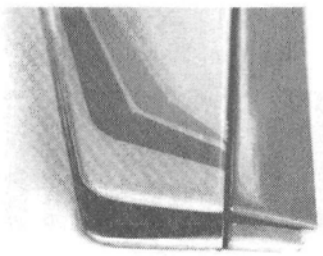
Our objectives were met: the plane was still extremely easy to build; it was easy for an advanced beginner or a new intermediate pilot to control, and it provided us with a new level of flying.

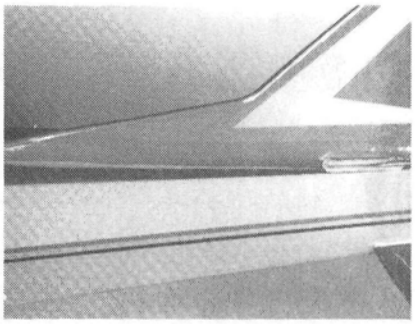
We enjoy the surprised looks of other pilots when they see our mild-looking Aero-Star fly inverted and perform outside loops, Lomcevaks and vertical climbs!

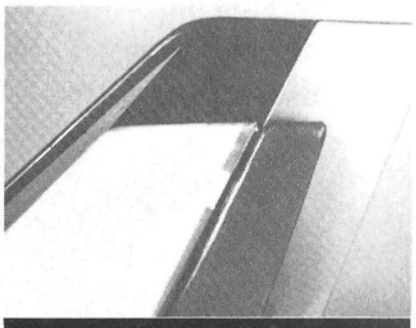


The tuned pipe seems insane, but the plane can handle it as long as screws (upper left) replace rubber bands for holding on the wing.







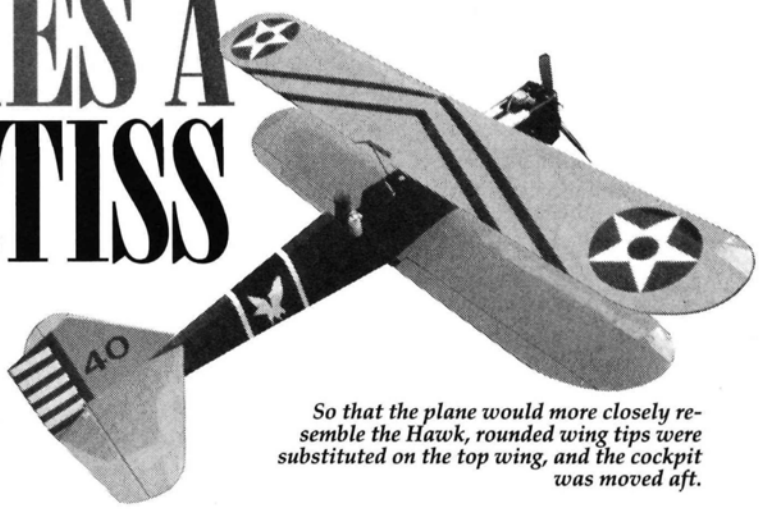


(Top to bottom): ■ The drooped Horner wing tips are designed to increase the slow-speed stability of the flat-bottom wing. ■ We originally tried to add an inch to the elevator, but realized it was just too much. We settled for 3/8 of an inch and maximum throw. ■ We moved the vertical stabilizer forward 1 inch to keep things lined up and similar to the stock layout. ■ The difference between the old rudder (front) and the new (rear) is like night and day. (Same thing with those snap rolls.)

**Here are the addresses of the companies mentioned in this article:*
Midwest Products, *400 S. Indiana St., Hobart, IN 46342.*
Futaba Corp. of America, *4 Studebaker, Irvine, CA 92718.*
Mac's Products, *7935A Carlton Rd., Sacramento, CA 95826.* ■

KIT-BASHING!

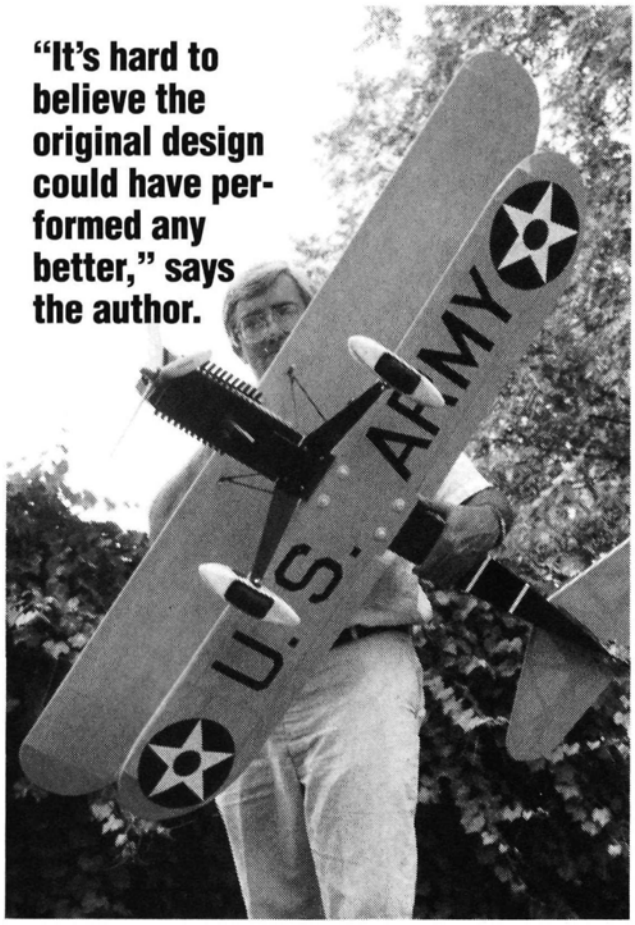
ACE BIPE BECOMES A CURTISS P-6E HAWK



So that the plane would more closely resemble the Hawk, rounded wing tips were substituted on the top wing, and the cockpit was moved aft.

by JAMES E. McQUEEN

Bashing an Ace R/C 4-60/90 bipe into a sport-scale model of the Hawk



"It's hard to believe the original design could have performed any better," says the author.

HAVE YOU EVER seen a kit that made your imagination run wild? I have: it was Ace R/C's* 4-60/90 bipe, and my inspiration was the Curtiss P-6E Hawk.

THE PLAN

I sorted through the kit for a few days and hoped that my 34 years of modeling experience would guide me through the project. The idea of showing off the finished Hawk at the flying field spurred me on.

Having read about the great flying characteristics of the 4-120 bipe, I knew the 4-60/90 kit had been designed to eliminate the problems associated with scale biplanes. Even the cabane struts had to be one of the simplest designs possible—no flying wires or "N" struts—but what about the alterations needed to make it resemble the P-6E Hawk? I wanted to keep it simple. After much thought, I decided that I could pull it off, so with 3-view scale drawings in hand, I began to rework the original design.

THE EXECUTION

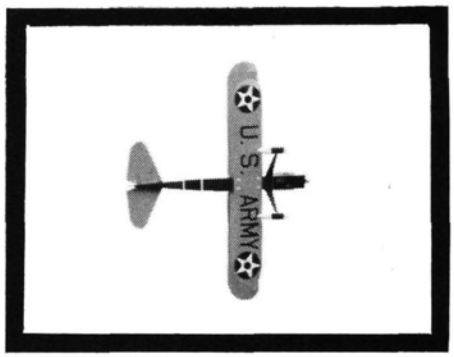
I built the top wing as designed, but I discarded the original wing tips and cut new rounded ones from lite-ply. I did the same for the bottom wing, but to achieve a scale appearance, I had to cut away some of the aileron stock near the tips.

Except for the cowling, the top fuselage deck and the sta-

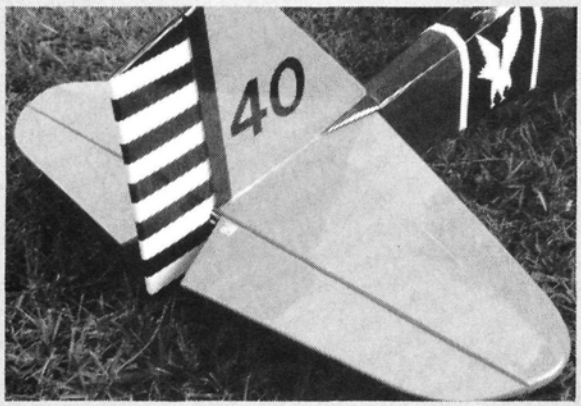
ACE BIPE BECOMES A CURTISS P-6E HAWK

SPECIFICATIONS

Type: *Fun scale*
Wingspan: *Top—58 inches; bottom—50 inches*
Weight: *7.5 pounds*
Wing Area: *930 square inches*
Wing Loading: *18.57 ounces/square foot*
Power Req'd: *0.S. Max .90 4-stroke, with 3-blade Graupner 12x8*
No. of Channels Req'd: *4*



bilizer mounting area, I built the fuselage according to the directions. The original design left much of the engine exposed. For the effect I wanted, the cowling had to be raised, and this meant that I also had to raise and lengthen the fuselage top deck. I moved the cockpit area back so that it more closely resembled that of the Hawk. Because of the difference in the root chord, I had to lengthen the stabilizer mounting plate.



Fin and rudder were reshaped to a scale configuration, while preserving the number of square inches.

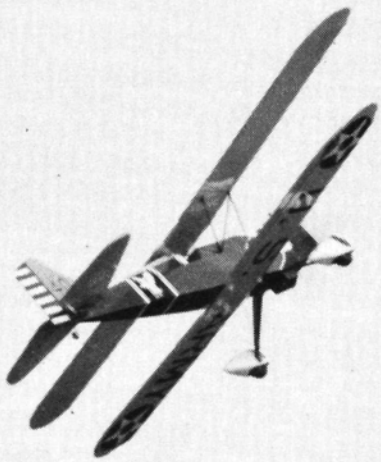
All that remained was to reshape the fin and rudder while keeping the same number of square inches. I discarded the original stabilizer and, using the same area and construction method, made a new one in a scale configuration. My only other modification was to use a Great Planes* tailwheel assembly.

To feed the thirsty O.S.* Max .90 4-stroke (which I had shock-mounted using the new Iso-mounts from Davis Diesel*), I used a 12-ounce tank (instead of the 10-ounce one the kit called for). Because the engine is almost fully cowled, I made a good-size vent directly behind the propeller to let in cooling air. Openings of equal or greater area around the top of the engine and in the bottom of the cowling allow the air to escape so that the engine is cooled properly.

THE EVALUATION

It was time! Would the first flight mean instant glory, or the destruction of six months of spare time? Much to my excitement, the plane flew like a hawk—it was majestic, graceful and just as aerobatic. It's difficult to believe the original design could have performed any better.

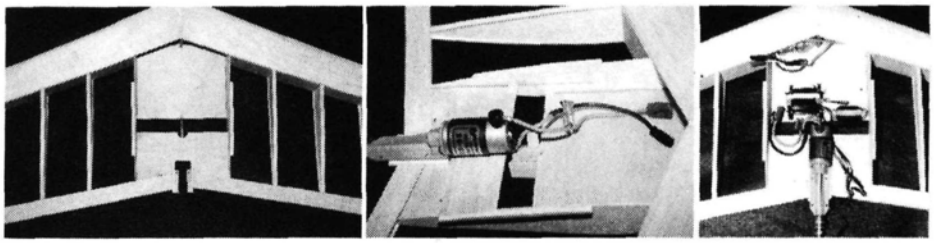
I've caught some flack from my wife about this design. She said it would be all right if I were 19 again...but isn't that what flying is all about?—oh, to be 19 forever! My congratulations to Ace R/C and D.B. "Doc" Mathews (one of its premier designers) for another great airplane kit!



The "bashed" bipe takes to the air. In flight, it's majestic, graceful and just as aerobatic as the Ace Bipe kit.

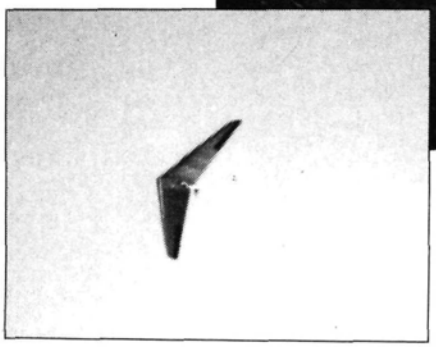
**Here are the addresses of the companies mentioned in this article:*
Ace R/C Inc., *116 W. 19th St., Box 511C, Higginsville, MO 64037.*
Great Planes Model Manufacturing Co., *P.O. Box 788, Urbana, IL 61801.*
O.S. Engines/Great Planes Model Distributors, *1608 Interstate Dr., P.O. Box 4021, Champaign, IL 61820.*
Davis Diesel Development, *P.O. Box 141, Milford, CT 06460.* ■

KIT-BASHING!



Above right (from left to right): ■ Cut-outs in the motor deck accommodate the motor-brush housing and the gearbox. ■ Motor deck is positioned along a line running between the rib's leading and trailing edges. ■ For mechanically mixed elevon control, the aileron input servo (left) is moved on a sliding tray by the elevator input servo (right).





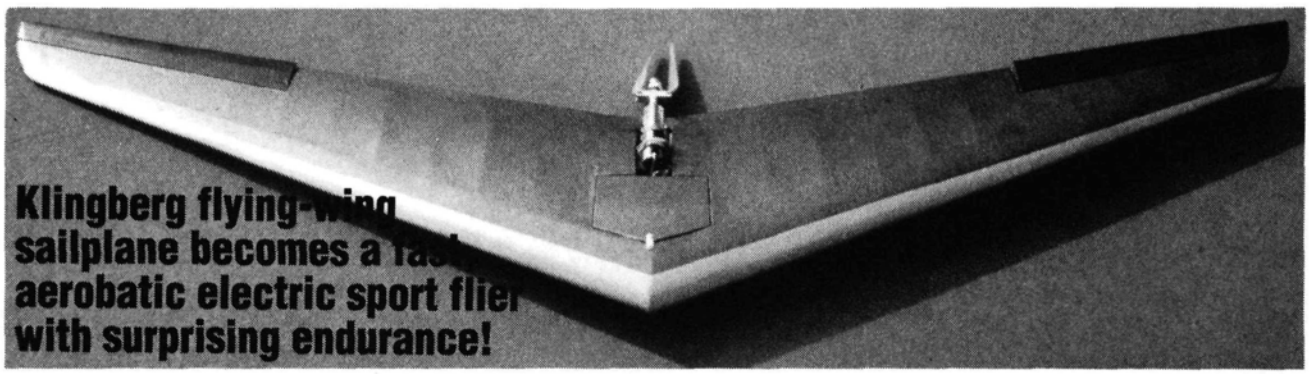
"That thing doesn't look like
will fly."..."I hope you ha
good eyes, given that wing
profile."..."Let's stick around to see wh
this thing can do." These were the cor
ments at the flying field before I flew t
pusher flying wing that I call the "Op
mized Electric." After testing, the cor
ments changed: "That thing really fle
well. I'm impressed!"

For me, one of the most rewarding a
tivities in modeling is altering a kit's d
sign to enhance (or just change) its perfor
ance. Because a slight increase in t
power-to-weight ratio of an electric power system can substantially improve flying pe
formance, I wondered whether "bashing" a flying-wing sailplane into an electric sport fli
might produce a good (great?) sport plane. Chucking the fuselage and tail feathers wou
reduce the weight and total drag. Could careful choice of motor, batteries, speed controll
and propeller further "optimize" this hypothetical sport electric? How would its perfor
ance compare with that of the ubiquitous gas trainer!?

PART 1

THE OPTIMIZED ELECTRIC

by TOM ATWOOD



Klingberg flying-wing sailplane becomes a fast aerobatic electric sport flier with surprising endurance!

ELECTRIC FLIGHT DESIGN—RULES OF THUMB

Not all planes are suitable for electric flight, and weight is a key considera-tion. These "rules of thumb" are starting points only:

● The power-system-to-airframe weight rule: In his product's literature, Astro's Bob Boucher notes that if your airframe's weight is more than twice that of the power system, you might be better off jumping up and down on your plane and starting over! If their weights are roughly equal, you're probably in good shape.

● The following ratios can help you to predict performance based on power and weight. Motor "input power" is typically rated in watts. The powerplant's rating in watts is compared with the model plane's total weight in pounds.

As far I can tell, the next rule of thumb was articulated by Bob Kopski, "Model Aviation" electric columnist, and the final two by Keith Shaw, a nationally known electric modeler. Note that sleeker models with lower wing loadings, such as the Klingberg Wing, require less power for the same pe formance.

● Power needed to ROG is between 30 and 50 watts per pound.

● Power needed for sport aerobatics is 40 to 60 watts per pound (sufficien for loops, rolls, Cuban-8s, stall turns and spins).

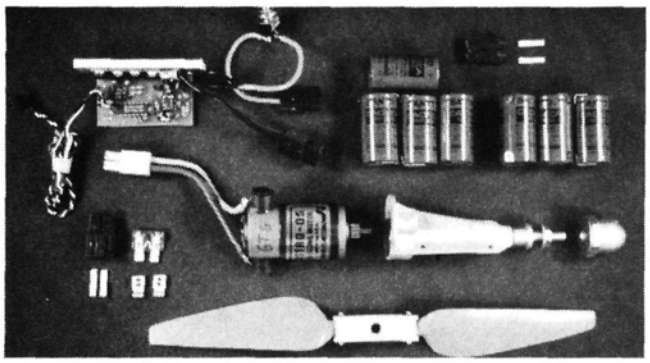
With a standard 05 cobalt, the powered Wing should require 3.18 pound x 50 watts per pound, or 159 watts. The standard 05 cobalt, which is rated 125 watts, will provide 39.3 watts/pound. The 200-watt FAI 05 provides 6 watts per pound.

● Power for good aerobatics is 70 to 100 watts per pound (which, with a star dard planform, would permit outsides, knife-edge, vertical rolls, etc.).

Some rules of thumb on prop selection and estimation of flight duratio will be provided in Part II of this article.

SPECIFICATIONS

Type: *Flying-wing sailplane turned electric sport flier*
Wingspan: *78 inches*
Weight: *3 pounds, 2.8 ounces*
Wing Area: *650 square inches*
Wing Loading: *11.3 ounces per square foot*
Power Req'd: *Options tested include 035, 05 and FAI 05 cobalt motors*
No. of Channels Req'd: *3 (throttle and elevator/aileron input to elevons)*



Components for the electric power system, from left to right: top row: Jomar SC-4 speed controller (discontinued, but Jomar provides a new model), seven Sanyo 1200mAh Ni-Cd cells and Sermos connectors. Middle row: Sermos connectors for motor leads, 30-amp auto fuse and connectors, Astro FAI geared cobalt motor, Leisure 2.5:1 extended gearbox, Higley safety nut. Bottom row: Sonic-Tronic 11x7 folding prop.

To find out, I needed an all-around flying-wing design. The Klingberg Wing (see the review in *MAN's* December '89 issue) was perfect for the experiment, because it's stable in flight, aerobatic and has an excellent glide ratio.

I discussed the project with designer Rollin Klingberg of Future Flight*. He explained that the kit was a prototype of the full-size, foot-launched glider (see sidebar, this page). Although it wasn't designed for the kind of powered flight I had in mind, the kitted version had been loaded with 1 pound for slope soaring, and this was the "green light" for me to add a pusher electric power system.

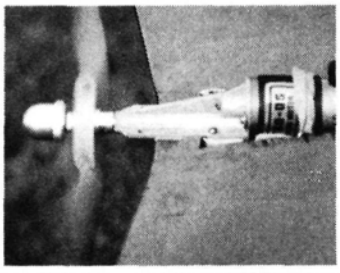
PLANNING

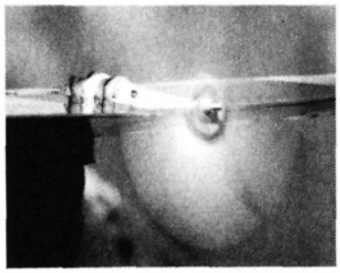
I planned to test the Wing with a cobalt 035 (rated at 90 watts), a stock cobalt 05 (rated at 125) and a cobalt FAI 05 (rated at 200)—all motors made by Astro Flight.* Because they have strong samarium cobalt magnets, can run at high current levels and survive temperatures that would be unhealthy for ferrites, cobalts offer great performance.

I chose six SR Batteries* 1250mAh Magnums, which are notable for their lightness, and seven Sanyo* SCR 1200mAh cells, which are great for sport flying with large motors.

SR supplied the propellers—a 9.5x5 Aero-Naut folding prop for use with the 035 motor and an 11x7 Sonic-Tronic folder for the 05. I chose a Leisure* 2.5:1 extended gearbox, which allows the motor to be mounted further inboard. It helps get the balance point right and offsets the prop shaft from the motor shaft for a center thrust line.

Calculating a plane's weight is a good way to predict its performance (see sidebar, opening page). My power-system components "weighed in" as follows:





The propeller can be folded forward into the trailing edge when power is turned off, but centrifugal force prevents contact during flight.

ITEM	WEIGHT (IN OUNCES) 035 version	05 version
Astro cobalt motor	5.0	7.0
Speed controller	2.0	2.0
6-cell SR 1250mAh pack	7.0	
7-cell SCR 1200mAh pack		13.40
Aero-Naut 9x5.5 prop	0.80	
Sonic-Tronic 11x7 prop		0.94
Leisure extended gearbox	1.39	1.39
Safety nut	0.60	.60
Total:	16.79	25.33

The heavier 7-cell, 05 configuration had an all-up weight of approximately 50.8 ounces, or 3.18 pounds. With 650 squares of wing, this yields a wing loading of about 11.3 ounces per square

(Continued on page 53)



WINGING IT

The Klingberg Wing was designed to be the first full-size, "foot-launchable sailplane." In many respects, it represents the next generation in the hang-glider lineage. The prototype has an empty weight of 85 pounds and a length of 20 feet when folded, and it can be transported on top of a car.

The spar is a D-tube from the leading edge to the quarter-chord point. On the prototype, ribs and fabric were used aft of the spar. Rigid elevons, controlled by a side stick, were connected to a flexible trailing edge. The prototype also included spoilers for approach control, a parachute and a full instrument deck! There was no active yaw control, however, because designer Rollin Klingberg said that it simply isn't needed on pure flying wings. Whenever adverse yaw occurred on entering a turn, "...it was up to the pilot to ignore this effect"!

These are some of the Wing's specifications:

Wingspan	38 feet
Wing Loading (at 200 lbs.)	19.4 ounces/square foot
Area	165 square feet
Empty Weight	85 pounds
Max. Glide Ratio	approx. 25:1
Max. Air Speed	70mph
Stall speed (at 200 lbs.)	20mph
Washout	8.0 degrees

For more information about this remarkable aircraft (a videotape is available), contact Future Flight.

CONSTRUCTION OF THE PBY Super Catalina

This scratch-builder's dream might intimidate some full-size planes!

"ALWAYS" PART II



By anyone's standards, the PBY is a major scale project. Moviegoers might not have noticed that the water in "Always" is also 1/8 scale!—a mixture of microballoons and sugar simulates the scale appearance of water being released!



by GEORGE MILLER

MAKING THE MODEL B-26C Invaders for the movie "Always" was quite an experience! If you read my article in the May '90 issue of *MAN*, you already know this, but that was only part of the story. We also had to build R/C PBY Catalinas, and whereas the Invaders had 14-foot wingspans, the PBYs spanned *21 feet*. I discovered one thing: no matter how vividly you imagine a PBY with a 21-foot wingspan, you can't really understand its size until you see it. I think they're the second-largest R/C aircraft ever built.

The PBY used in the movie is called a "Super Catalina." It was extensively modified—different engines, cowlings and nacelles and a reconstructed nose. Although the PBY doesn't play a large role, it's a very important one. Because of the way it was used in most of the footage, it had to be controlled by R/C or wires. There weren't any shots in which the PBY had to take off from the ground, so we decided to launch it from a dolly and then belly-land it in soft dirt. We saved time and money by omitting this unnecessary function. Its estimated top speed was 60mph, and its stall landing speed was about 15mph.

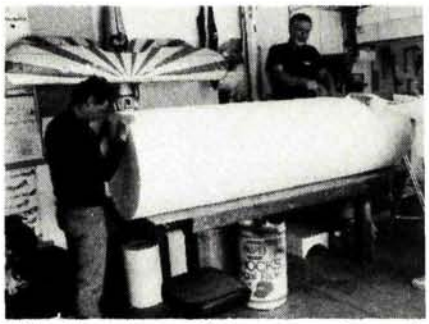
SPECIFICATIONS

Wingspan: *21 feet*
Chord: *36 inches, slightly tapered to a 28-inch tip chord*
Weight: *140 pounds*
Length: *13.5 feet*
Wing Area: *approximately 58.3 square feet, or 8,395 square inches*
Wing loading: *38.4 ounces per square foot*
Power req'd: *two Zack Dobler 5.8 engines*
No. of Channels Req'd: *6—rudder, elevator, aileron, two separate throttle channels and one for the water drop.*
Estimated Flying Speed: *up to 60mph*
Estimated Stall Landing Speed: *15mph*



PHOTOS BY GEORGE MILLER





Two large foam cylinders are used to make fuselage plug.

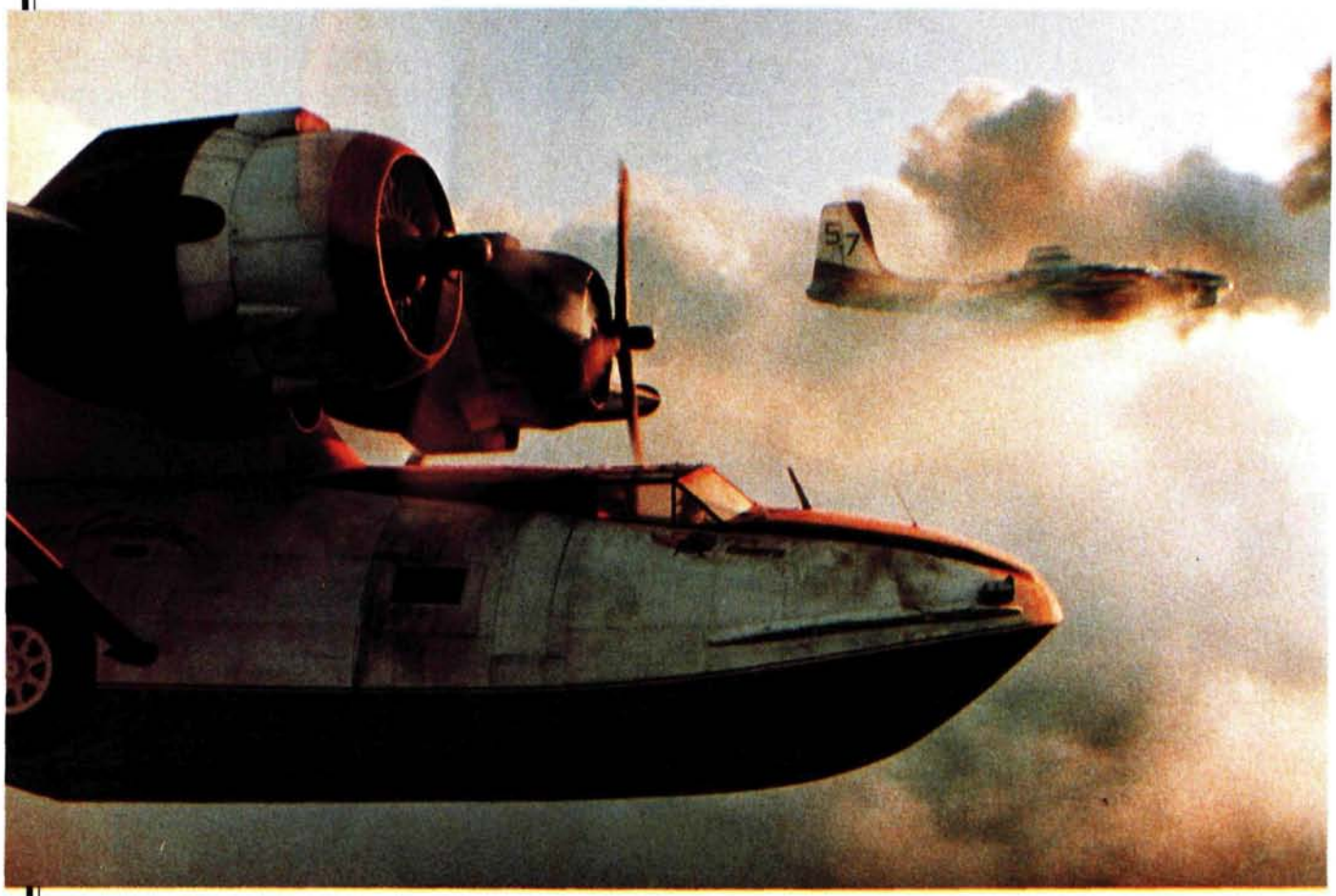
A SIZEABLE SEAPLANE

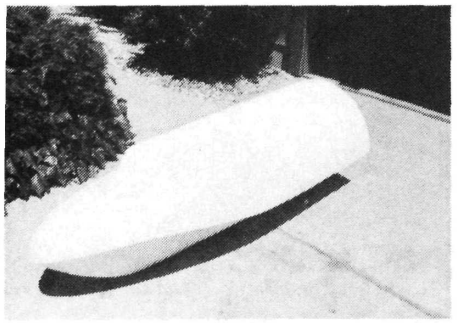
How do you build such a huge R/C seaplane? You start by studying a tiny plastic model, looking for datum lines, reference points, and constant areas from which to build. Given the size required and the aircraft's sculpted shape, it seemed obvious that the best approach would be to carve its fuselage plug out of solid foam.

How did I sculpt a fuselage out of foam? I just carved away everything that didn't look like a PBY! Of course, it isn't that simple, but that's basically what I did. When the plug had been carved and epoxied, the molds were laid up.

At this point, we were all starting to appreciate the size of this giant. Have you ever made rib templates for your foam cutter that are 36 inches long and 6 inches thick?—and this continues for 21 feet! To a modeler, the vertical tail feathers were the only parts that looked even close to normal size. The vertical tailplane and rudder look like a 6-foot wing for a giant-scale airplane.

For power, we used Sachs-Dolmar 5.8-cubic-inch engines from A&M Aircraft Supply*, and for control, I chose my usual Airtronics* Vision radio. (I'd never be without *that!* If you fly an expensive or treasured aircraft, you're making a mistake if you don't entrust it to an Airtronics radio!)



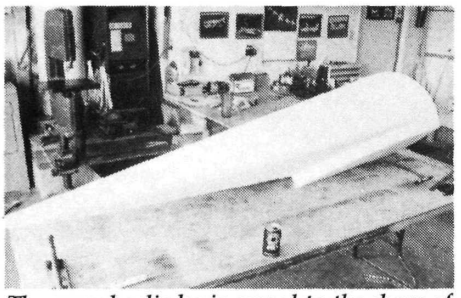


The first cylinder is carved to the shape of the forward half of the PBY's fuselage.

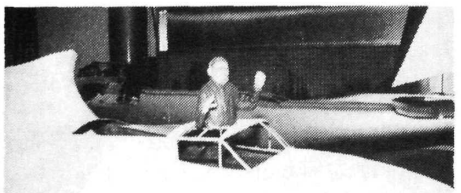
We sheeted all the flying surfaces with 1/64-inch ply, and the fuselage cowls and nacelles are covered with two layers of 9-ounce glass-cloth and polyester resin. The PBY has the four standard controls and an extra one for the operational storage tank, from which water was dropped. Two separate channels were used for the twin engines' throttles, so the engines can be independently adjusted.

Automotive lacquer, detailed to a high degree, provides the PBY's topcoat. For

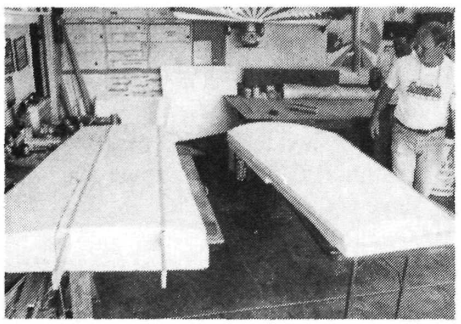
(Continued on page 48)



The second cylinder is carved to the shape of the aft portion of the fuselage.



The model pilot is a look-alike of John Goodman, pilot of the PBY.



Spars and wiring for the lights are installed in foam-cores.

Over the Amazon in '44!— MAN'S Man Was There!

by TOM ATWOOD



Like the DC-3, the PBY Catalina is a workhorse of a plane that came into service before World War II. A member of the far-ranging Squadron VJ16, MAN contributor Dick Purdy flew the PBY and many other Navy planes during the war. While stationed in Brazil in 1944, he piloted an amphibious PBY-5A on a trip from Recife to Rio de Janeiro. The reason for his trip?—some well-earned R&R; just one weekend in an assignment lasting several months.

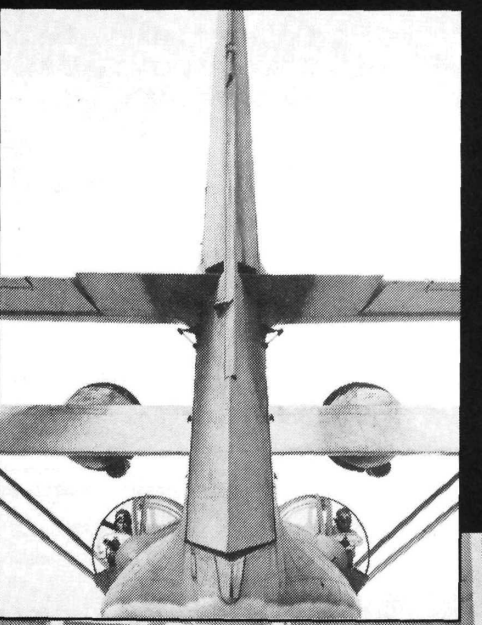
Dick says that while a crew of eight or nine was asleep in the rear of the plane, "We elected to cut straight across the eastern portion of Brazil to minimize flight time on the expected 9-hour trip. Our flying charts were sketchy, at best, so we used our radio compass and watched for key navigational milestones.

"Over the Amazon, the weather became absolutely foul. We found ourselves in an enormous storm, surrounded by violent, driving rain, wind and lightning. A cloud ceiling had formed at 400 feet, forcing us to fly the PBY a few hundred feet above the treetops. Our radio compass became useless, and we turned to the magnetic compass only to see it wildly oscillating between dead north and dead south. The Amazon was in flood, so instead of navigational milestones, we saw a freshwater ocean punctuated by trees below us!

"I decided to split the difference in the compass swings and fly the PBY—we hoped!—eastward to the coast. The situation was completely unknown to the slumbering crew. It worked! An hour or so later, we spotted the beach and turned south to track the coast to Rio, still under a 400-foot ceiling.

"On the flight south, I would scan the beach ahead and then look back to the instrument panel. At one point, to rest my eyes, I looked upward into the cloud ceiling only to see the front of a blimp directly in front of us on a collision course! It was close! I pushed the yoke forward to dive under the blimp, which we barely missed, and worked not to hit the beach with the PBY. All this woke the guys in back up, as they were bouncing around like popcorn. I never learned the name of the pilot of the blimp, who was clearly using the same navigation strategy."

Of course, Dick says the most exciting part of the trip was the weekend in Rio! If the pilot of that blimp is out there, drop us a line!





Ready for action. Free-swinging 50-calibur guns in each blister made enemy approaches dangerous.

This "Consolidated" PBY-5A was equipped with a rigid boat under the port wing for air/sea rescue.

PHOTOS—MODEL AIRPLANE NEWS ARCHIVES



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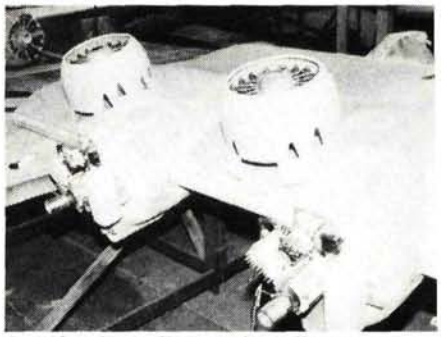
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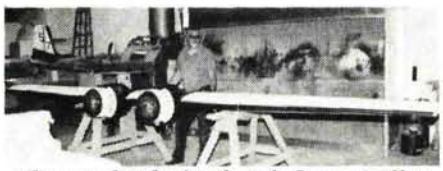
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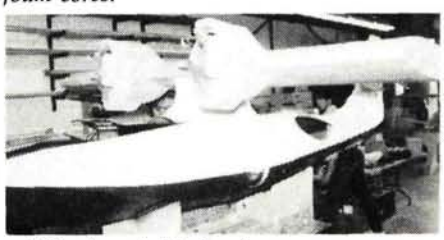
Completed installation of nacelles, engines and cowls.



The completed wing dwarfs George Miller.



Sliding aluminum tubes are installed in stab foam-cores.



Wing is mated to fuselage.

realism, every panel line and rivet is fully detailed. How many rivets?—*days* of them! But the effort was worth it, because even when you're standing next to them, these PBYs look like "real" aircraft.

When we had completed the PBYs and B-26 Invaders, we were ready to go on location. "Always" is a movie about love and letting go, but it centers on the dangers inherent in fighting forest fires from the air. In most of this action, you'll see model aircraft, but if I hadn't told you, I bet you'd never have guessed!

In my next article, I'll describe other Custom R/C Aircraft* movie giants. Have you spotted any?

**Here are the addresses of the companies mentioned in this article:*
***Airtronics, Inc.,** 11 Autry, Irvine, CA 92718.*
***A&M Aircraft Supply,** 1428 McArthur, Suite 102, Carrolton, TX 75002.*
***Custom R/C Aircraft,** 249 Robin Way, Santa Rosa, CA 95407.* ■

FIFTY YEARS AGO

(Continued from page 19)

and its unusual shape made it a speedy, efficient flier. Its narrow, deep, wedge body eliminated the need for landing struts (which cause drag) and offered little head resistance. To decrease stalling and give a flat glide, the wings had a negative angle of incidence. Nine ships of different sizes were built, and all had the "Flying Wedge's" characteristic, tight, corkscrew climb and right, circular glide. It was exceptionally stable, great for soaring and could easily catch thermals—even at sunset!

The Wedgy had the "speed of a rocket," the XB-19 was the size of a house, but neither modelers nor full-size designers in 1940 were satisfied! ■

CONFESSIONS

(Continued from page 32)

Before you finalize your plan, draw the side and top views of your engine to scale on it. This will help you avoid having to chop the front of your airplane to accommodate the engine, the muffler, the pressure line, or the needle valve. This is the time when you should decide where you'll put your fuel filler.

When you've drawn your plan, the rest is relatively easy, and building your own design is much more fun than building someone else's. To add realism to the finished aircraft, don't forget to detail the cockpit. A little time taken here makes a huge difference to the finished product. If you want to change the canopy, several of those available can be cut to fit. (Sig Mfg.* makes several sizes.) It's usually best to buy one that's oversize, then use just the section that conforms to your design and fits the profile of your turtle deck.

Here are some examples of the ways in which I've bashed some kits!

Andrews Sport Master turned Messerschmitt

On the basic kit, changes were made to the fuselage, fin and rudder:

- moved cockpit back and reshaped it
- rounded fin and rudder
- "cowled" the engine
- added machine guns and exhaust stacks
- used Messerschmitt color scheme

(This effort won 1st place in Sport at the Wram show.)

Great Planes* Super Sportster 60 turned MiG

Changes were made to the fuselage, fin

(Continued on page 53)



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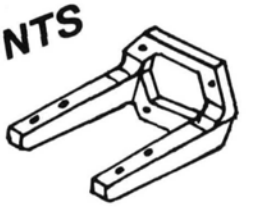
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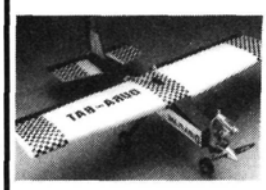
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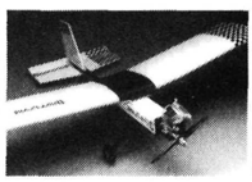
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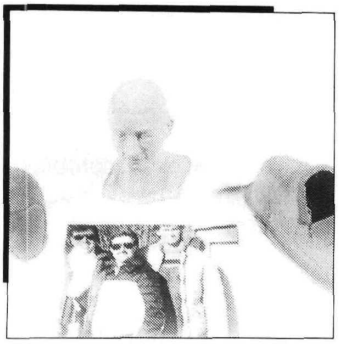
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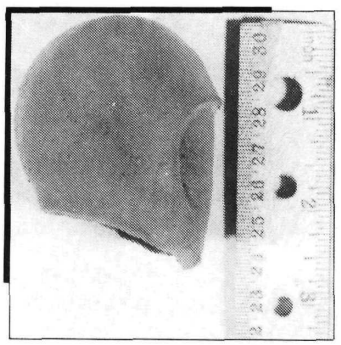
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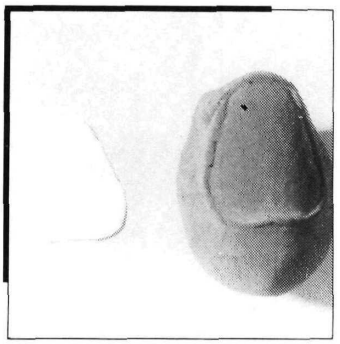
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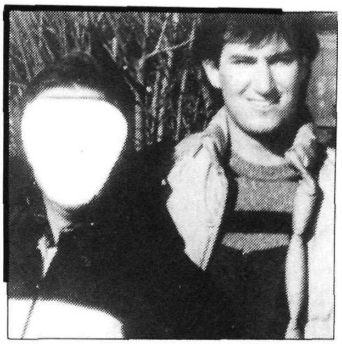
1. Start with a color photo of your face and a pilot figure of the appropriate size. Shown: the Glavianos!



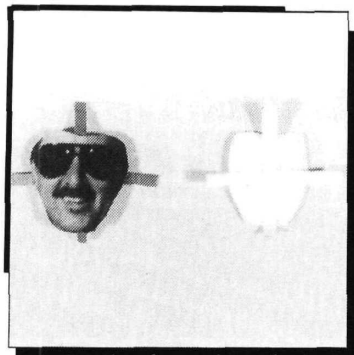
2. Measure the pilot's helmet from the tip of its chin strap to its top—in this case, 2 5/8 inches.



3. Make a paper template of the front of the helmet where the pilot's face will protrude.



4. Position the template on the enlarged photograph, and lightly trace its outline.



5. Cut the photo along the template lines and attach the hold-down strips.

PUT *YOURSELF* INTO THE COCKPIT OF YOUR R/C AIRCRAFT

Add a realistic finishing touch with this easy pilot modification

by STEVEN A. GLAVIANO

HAVE YOU EVER noticed how much authentic pilot figures improve a model's appearance? By creating a replica of yourself, you can add a realistic touch to the cockpit of your pride and joy!

FLY-BOY FACE

Start with a color photograph of yourself and a pilot figure of the appropriate size. The popular DGA* Scale-Model Pilot Kit produces an exceptionally realistic pilot that comes in a variety of sizes and is ideal for this project.

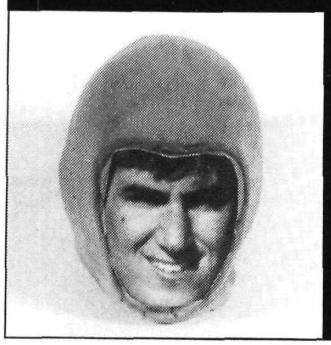
The secret to producing a lifelike figure is to use a photograph of the correct size. Measure your pilot's helmet from the tip of the chin to the top of the head. On the DGA 1/4-scale pilot, this measurement is 2 5/8 inches. Take your photo negative to your neighborhood camera shop, or send it to a photo developing service. Have it enlarged so that the distance from your chin to the top of your head measures the same as your pilot's helmet (in this case, 2 5/8 inches). You should have at least two photo enlargements made—just in case!

TEMPLE TEMPLATES?

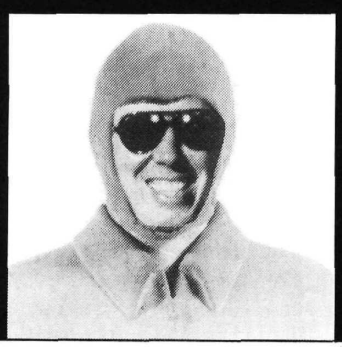
Make a paper template of the front of your pilot's helmet and place it over the enlarged photograph of your face. Position the template so that the correct part of the face looks out from the helmet. The entire chin and a small part of the forehead should appear within the template's outline. Lightly trace the outline of the template onto the photo. Cut the photograph along the lines you drew, and trial-fit it onto the helmet. If it looks right, touch-up the photograph paper's white edges with a brown, felt-tip pen.

To the back of the cutout of your face, cut out and then glue two, heavy-paper, hold-down strips (strips cut from old greeting cards work well). Position the photograph on the helmet, and mark the points where the hold-down strips should enter it. Using an X-Acto knife, cut slits through which the strips can enter the helmet. Color the hold-down strips brown to match the helmet. If the fit is good, glue the face onto the helmet. To complete the assembly, follow the instructions that come with your pilot-figure kit. When you've finished, you'll be the envy of every Walter Mitty at the flying field. Happy flying!

**Here's the address of the company mentioned in this article: DGA Designs, 135 E. Main St., Phelps, NY 14532..* ■



6. Glue the photograph of the face onto the helmet.



7. Here's the completed pilot figure.



8. Ready for takeoff!

CONFESSIONS

(Continued from page 49)

and landing gear:
- moved cockpit back and reshaped it
- reshaped fin slightly
- cowled the engine
- added an antenna post
- strengthened landing gear
- used MiG color scheme

(This creation won 3rd place in Sport at the Wram show.)

Pacific Aire Showbird turned Unitar

I changed everything except the basic wing planform. Only the ribs, spars and leading and trailing edges are from the kit; everything else is from scratch. (This won 1st place in Sport at the Wram show.)

Balsa USA* Enforcer turned Enforcerus

Changed only the fuselage and wing panels:
- redesigned the fuselage
- added thruster motors to the wings
- installed retracts

(This won 2nd place in Sport at the Wram and Toledo shows, and 1st-place MonoKote trophy at Toledo.)

Why not try these simple kit-bashing steps and see what surprises you can take to the flying field. You may find that you don't just surprise the *other* modelers!

**Here are the addresses of the companies mentioned in this article:*
***Sig Mfg. Co.**, 401 S. Front St., Montezuma, IA 50171.*
***Great Planes Model Distributors**, 1608 Interstate Dr., P.O. Box 4021, Champaign, IL 61820.*
***Balsa USA**, P.O. Box 164, Marinette, WI 54143.* ■

OPTIMIZED ELECTRIC

(Continued from page 43)

foot, compared with just under 9.4 ounces per square foot for the lighter 2.64-pound, 035-powered version. Without electric power, the ship has a wing loading of between 5.5 and 6 ounces per square foot.

I tried two speed controllers in the prototype—a Jomar* SC4 and a Graupner* micro MOS 400—with equal success. (Both are designed for higher current loads than I needed.) I used Sermos* connectors for all connections between the motor, the speed controller and the battery. For control, I chose an Airtronics* 4-channel FM with mechanically mixed miniservos, powered by a 250mAh battery.

BUILDING

Because the wing had to carry an additional 1 1/2 pounds, I converted the upper and lower 1/4x1/8-inch balsa spars to spruce. I epoxied spruce spacers between the bottom spar and the forward deck. I also epoxied a 1/8x1/4-inch spruce spar under the sheet-ply main deck. This secondary lower spar extends on each side of the wing to join the lower 1/4x1/8-inch spar at rib number four. Laminated to its underside is a strip of .014x5/16-inch carbon tape. A similar spar should be attached to the top of the wing, carbon-fiber side up.

To support the batteries more effectively, I epoxied light fiberglass to the inside of the front bulkheads. Tight control linkages are a must. If you use a mechanical mixing tray, make sure there's no slop in its action. The servos can be positioned right in front of the motor.

MOUNTING MOTOR AND GEARBOX

I used a sheet of 1/16-inch lite-ply for the motor deck, which is 3 1/2 inches deep and

(Continued on page 62)

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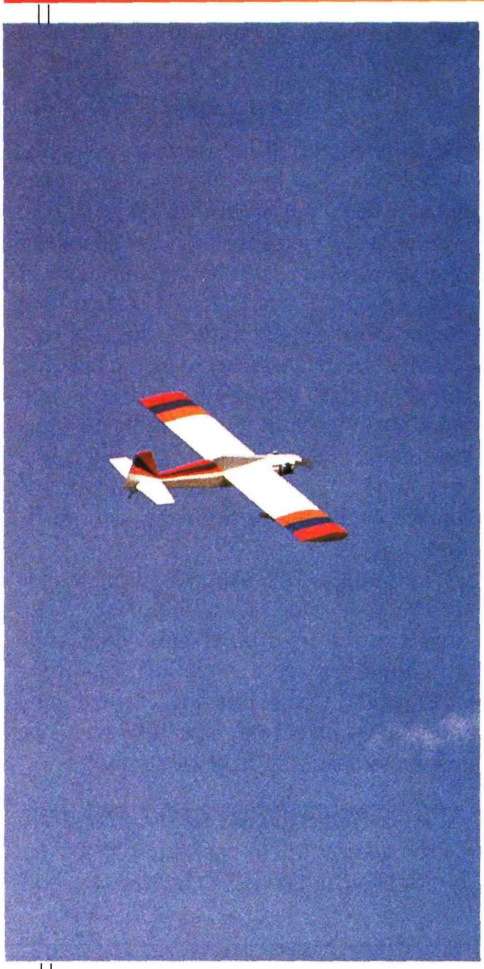
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Ultra Hots

Its creator says the Ultra Hots might just be the best performer in the series!

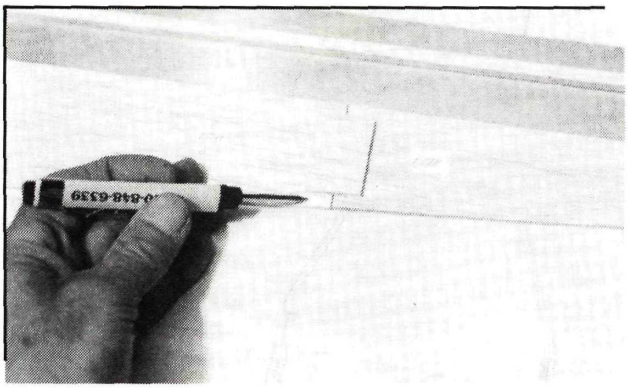
by DAN SANTICH

SPECIFICATIONS

Type: *High-performance, aerobatic sport plane*
Length: *64.5 inches*
Weight: *11 to 16 pounds*
Wingspan: *81 inches*
Wing Area: *1,336 square inches*
Wing Loading: *23.3 ounces per square foot (assuming a weight of 13.5 pounds)*
Power Req'd: *1.5 to 4ci engine*
No. of Channels Req'd: *4*



Suzanne Michelle Prince and Melissa Jarvenpaa of Oshkosh, WI, admire Dan's latest creation.



To join F17A and F17B, glue a 1/8 balsa joiner to the rear of the sides.

HAVE YOU EVER asked yourself why this hobby remains popular? Could it be because we enjoy making things and like to share our creativity? In essence, modeling projects aren't too different from the works of great artists, sculptors, or architects. (I sometimes wonder what Leonardo da Vinci would fly if he were alive today—pattern, scale, or sport?!)

HOT CREATION

My latest creation—the Ultra Hots*—fills the gap between the Super Hots and the Big Hots. It's challenging, yet forgiving; you'll never grow tired of it or ask "Is that all there is?"

With its 91-inch wing, the Big Hots needs a lot of power to do the things a Hots is supposed to do, e.g., a "Space Shuttle" climb after takeoff. With a 4.2 Sachs, it's awesome! I put a Horner* Twin into my original Big Hots, and it was truly *hot*. (By the way, Gene Horner is back in business. If you want one of his engines, his address is at the end of this article.)

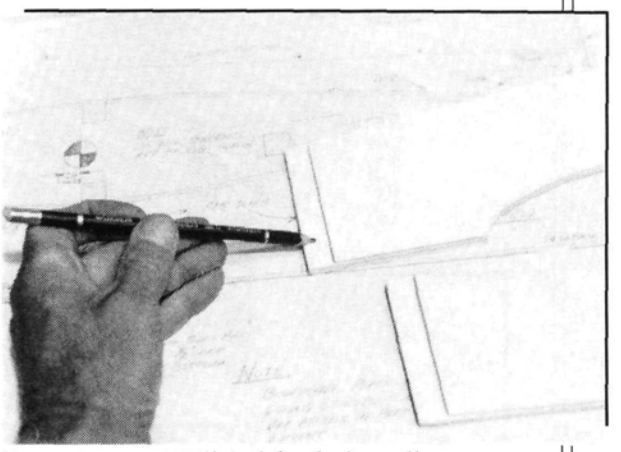
The Super Hots flies best with a good .60 up front. It has a light wing loading, so the sky is all yours! My first Hots was powered by a .40 ABC O.S.*, and it was truly wild at 3 1/2 pounds. When Midwest* kitted it and added lite-ply sides and a removable wing, things changed. Although the design was basically the same, the increased wing loading made a difference. Keep that in mind with the Ultra Hots; it flies best at 12 pounds. I haven't found its maximum weight yet, but I guess it's about 18 pounds.

ULTRA HOT!

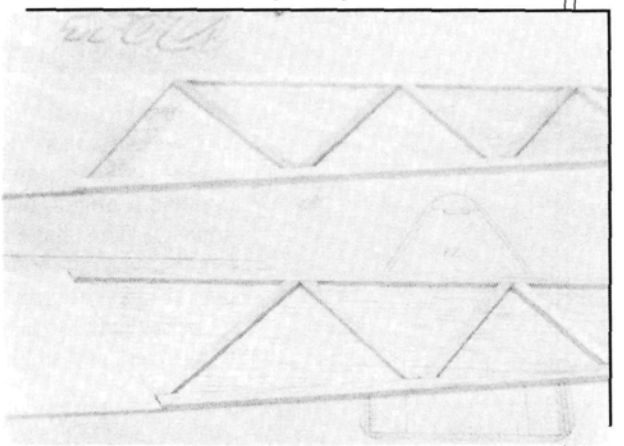
I've built nine Ultra Hots, and they all still fly, although one needed a new fuselage. (My friend forgot to tighten the wing hold-down bolt, and the wing broke off at 1,000 feet!) Another friend decided to trim some trees with his Ultra Hots! It hit a branch, spun around and dove nose-first into the ground. The airplane was flying the next day, though (and I have a videotape to prove it)!

This plane isn't indestructible, but its design is sound. If you decide to beef it up (as some modelers insist on doing), you'll only suffer a higher wing loading.

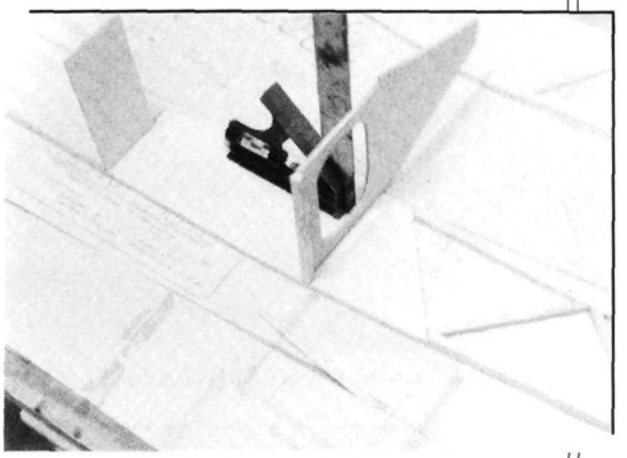
The Ultra is the most capable model in the Hots line, and its performance envelope is amazing. You can practically "walk" it around without fear of it stalling and falling. Takeoffs and landings are so easy, the plane practically does them for you! Be-



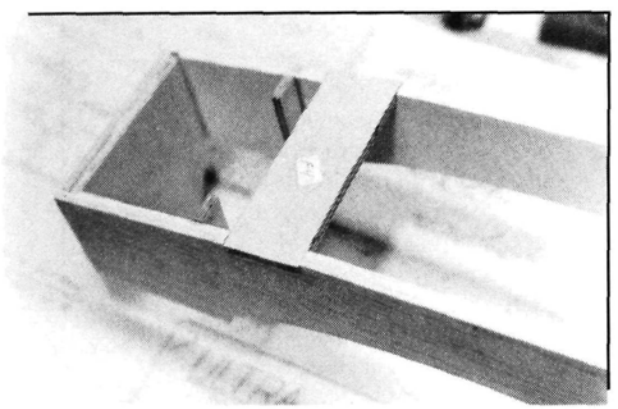
Be sure to recess F15 1/2 inch for the firewall.



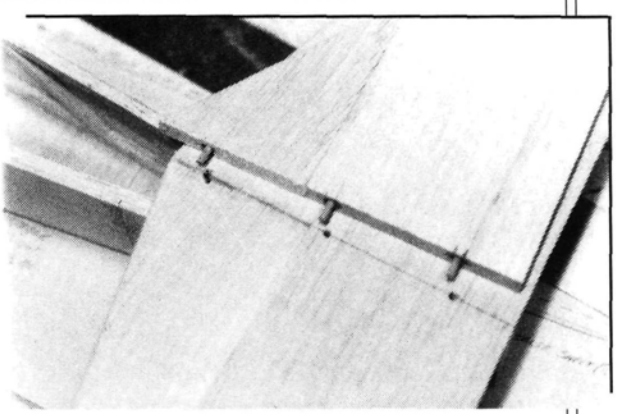
Add 1/4 square balsa stringers and braces to the sides.



Make sure all bulkheads are vertical.

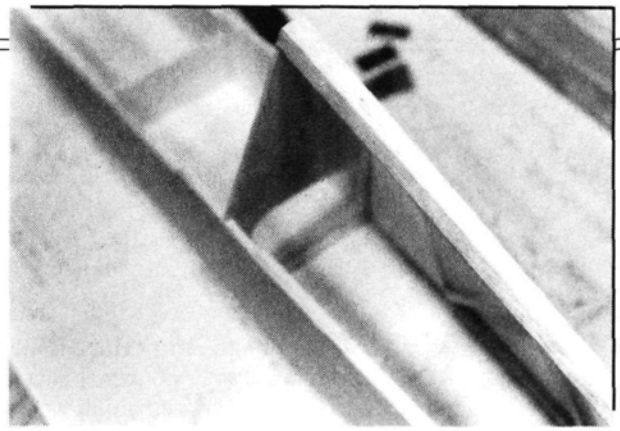


The landing-gear block is recessed 1/4 inch.



Hardwood dowels support the fin.

Ultra Hots



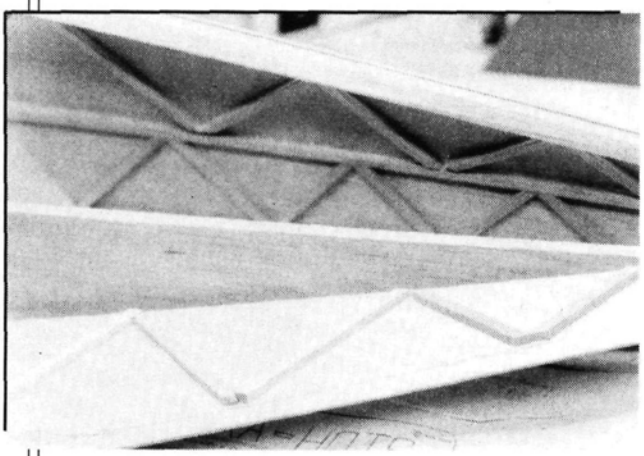
For "turtleback sides," shave the angle on crutch F13C.

cause you can fly it very slowly and still have full control, some have even used the Ultra Hots as a trainer!

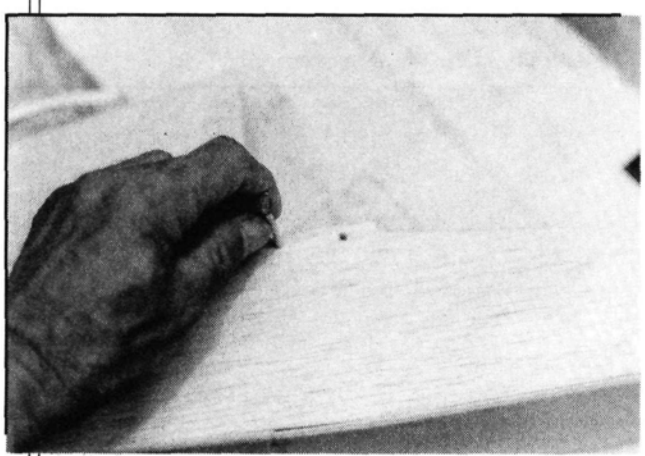
When you open the throttle, only your imagination and flying ability limit your fun. This plane flies so fast that you can bounce it all over the sky—doing inside loops, outside loops, spins, wing-overs and snaps—and never leave a 20-degree box! In other words, you can do everything right in front of you.

One of my friends loves to hover his Ultra Hots. He does a touch-and-go and, right after liftoff, he lifts the nose to vertical, throttle back, and just lets the airplane hang. He uses a Webra* Bully on glow with a tuned pipe, and his airplane weighs 12 1/4 pounds! After a 10-foot roll on takeoff, the plane will climb straight upward for as long as he wants! Mine does the same thing with a Sachs 3.2, and I also use a Bennett* smoke setup, which is really awesome.

You can use a variety of engines in this plane, including the Enya V240, O.S. BX-1, ST2500, ST3000, Quadra 35, OPS Maxi, G23 and Saito 270/300. I can't wait to see what it does with a Horner Twin!



The 1/4 square balsa braces greatly increase strength.

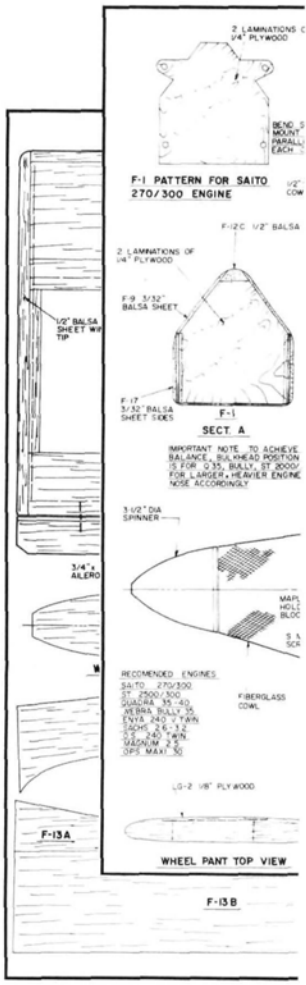


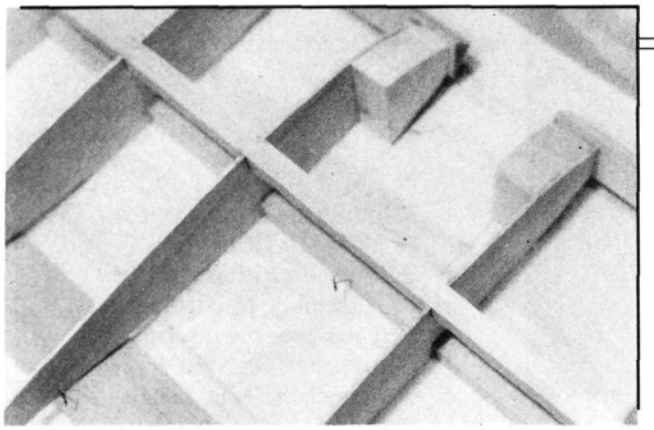
Hardwood dowels support the wing block.

HOTS HELP

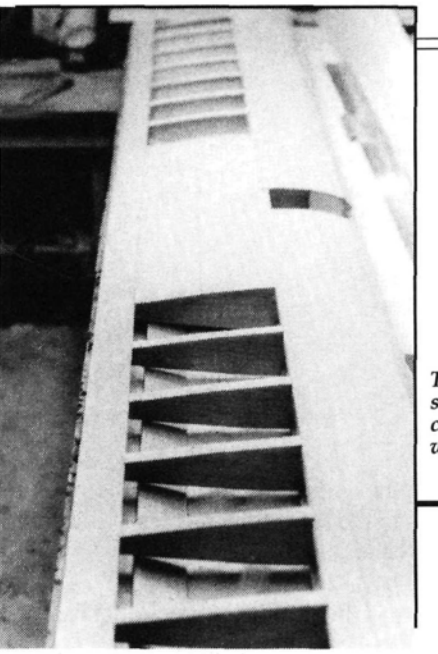
If you're new to big models, don't worry; you build this one just like the rest of the Hots; in fact, it's probably easier! No special equipment is required in construction, and a standard radio will fly it. I use two servos for my elevators (one to each side) connected by a Y-harness; I do the same for the ailerons. Everything else is standard.

Build the Ultra Hots, have fun with it, and let me know how you like it. If you don't want to scratch-build, I offer a kit. To make things even easier, I also sell a videotape about construction and flying. If you want references or help from any of the other builders, I can send you a list of names and addresses and details of the engine combinations they used.





Balsa blocks (W2) support the wing dowels.

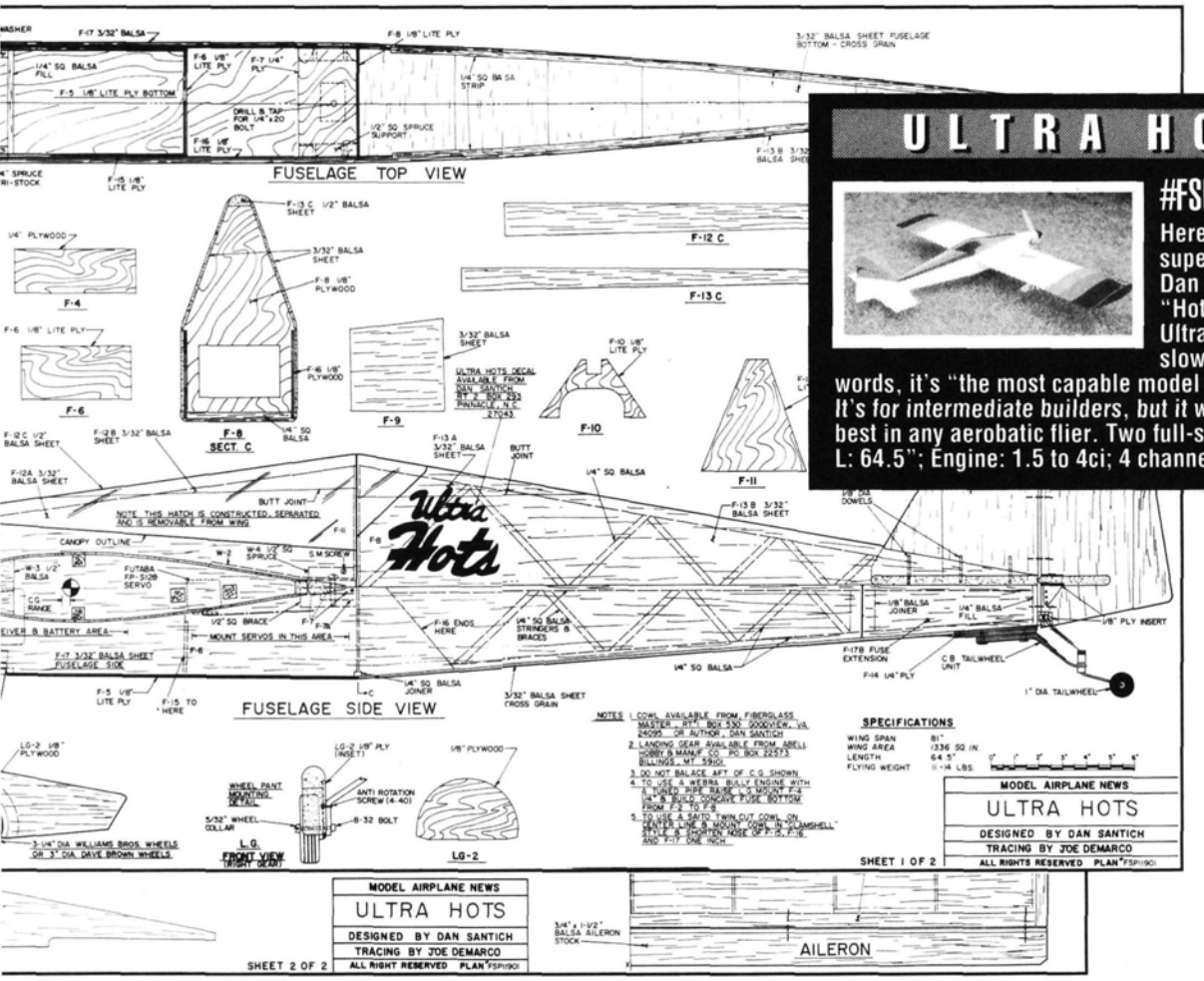


The wing is sheeted, and the caps are stripped with 3/32 balsa.

CONSTRUCTION

To build this model, you need a building board that's at least 81 inches long and 24 inches wide. *It must be absolutely flat.* I use a piece of 3/4-inch plywood mounted on 2x4-inch frames. As an adhesive, I use a combination of fast CA, slow CA and Titebond or Sigbond*. Because blueprint paper usually expands or contracts during reproduction, check each part for a proper fit before you glue it into place. If you follow the recommended building sequence, your Ultra Hots should be framed in about six hours.

First, join 1/8-inch balsa pieces F17A and F17B. Add the 1/8 balsa joiner, making sure that there's a 1/4-inch gap top and bottom. Now make the opposite side—*make sure it's opposite!*—and glue the lite-ply doubler (F16) to the fuselage sides. Glue the lite-ply tripler (F15) to F16, and remember to recess for F1. Glue 1/4-



ULTRA HOTS

#FSP11901 $18.50

Here's another fine, super-aerobatic flier in Dan Santich's immortal "Hots" lineage. The Ultra Hots is stable in slow flight but, in Dan's words, it's "the most capable model I have ever owned." It's for intermediate builders, but it will bring out the best in any aerobatic flier. Two full-size sheets. WS: 81"; L: 64.5"; Engine: 1.5 to 4ci; 4 channels. LD: 2.

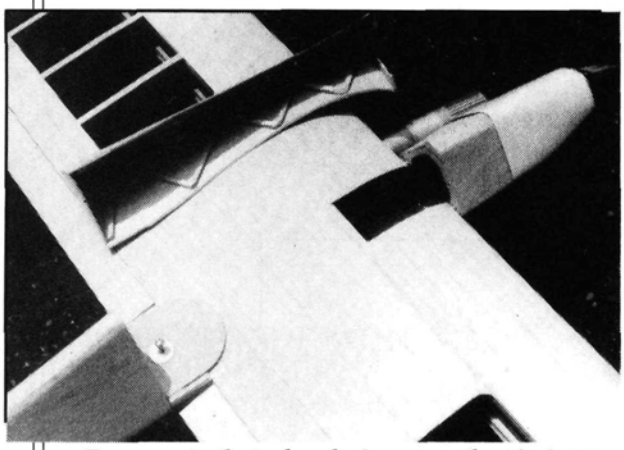
Order the full-scale plans... page 106



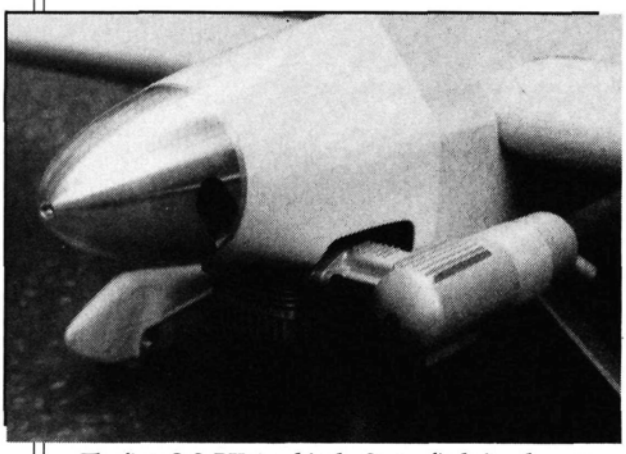
CB's 1/4-scale tail-wheel unit needs only one spring.

inch-square balsa longerons to the rear of the fuselage sides, and add 1/4 square balsa cross-braces.

Glue 1/4 square balsa fillers to the tail post, and glue the two 1/4 ply F1 firewalls to each other. Attach a 1/4 square balsa strip to the bottom of F8, and glue bulkheads F1, F2, F6 and F8 to one fuselage side. Before you add the other side, make sure that the bulkheads are vertical.



For access to the tank and wing screw, the wing's center is removable.



The first O.S. BX-1 to hit the States finds its place on the Ultra Hots.

Cut notches, and glue the 1/4 ply landing-gear block (F4) into place. Glue lite-ply bottom pieces F3 and F5 into place, and attach 1/4 square balsa fillers to the front and rear of F4. After you've trimmed the rear fuselage sides to a thickness of 3/8 inch, glue them together. Glue 1/8-inch balsa cross-grain to the rear fuselage bottom. Glue the horizontal stabilizer pieces together, and attach them to the fuse. Glue the 1/4 ply tail-wheel mount (F14) to the rear of the fuselage.

Drill 1/8-inch holes in the center of the stab and insert the dowels. Assemble the fin and mount it on the horizontal stab. Then glue the stabilizer assembly to the fuselage and check the alignment. Glue a 1/2-inch balsa crutch (F13C) between F8 and the fin, and trim the sides of F13C to the angle of F8.

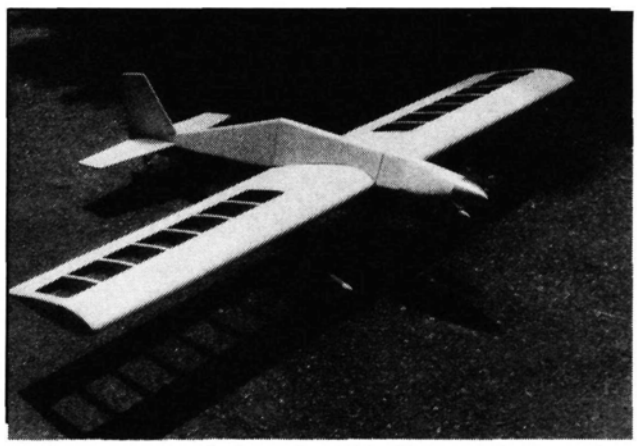
Join 3/32-inch balsa pieces F13A and F13B. Add 1/4 square balsa stiffeners to the F13 assembly, trim its lower edge to match the fuselage, and attach it. Glue the 1/4 ply wing mount (F7) into place, and add a 1/4 ply doubler (F7A) to its bottom surface. Drill 1/8-inch holes and insert dowels in F7, F2 and F1.

WING CONSTRUCTION

Cover the wing plan with wax paper. Glue the wing-spar extensions to the main spar, and pin the bottom spar to the table over the plans. Put all the ribs into position, block them up at the rear with aileron stock, and glue them into place. Next, glue the 1/2-inch-square balsa trailing edge, the top spar, the leading edge and the 1-inch balsa half rib (W3) into place. Glue the 3/32x2 1/2-inch trailing edge (which is cut from a 4-inch sheet) into place. Add the leftover 1 1/2-inch piece to another 4-inch sheet, and glue this 5 1/2-inch sheet to the leading edge, ribs and spar.

Glue 3/32x4x21-inch sheets to the center section, and glue capstrips to the ribs, being careful not to

(Continued on page 120)



Without an engine, the framed-up Ultra Hots weighs 7 pounds

SPORTY SCALE TECHNIQUES

by FRANK TIANO



A photo we have to share with you! Ron Gilman's exquisite F-86 is caught by MAN photographer Tony Nuner moments after takeoff...on its way to taking 1st place at Top Gun 1990. Will he repeat in '91? Word has it that Bob Fiorenze and a few other Jet Jocks will be attending.

IMAA, smokin' Mokis, chemical reactions, and more...

IT'S JUST a few weeks since the Nats (I'm typing this in July), and I'd be remiss if I didn't congratulate Bill McCallie of Tampa, FL, on his win in the Expert Scale Division of Sport Scale. We all knew that it was only a matter of time before Mac got the bugs worked out of that Bates P-40. I have quite a potpourri, so without further procrastination, let's get busy.

NEW, OLD FRATERNITY

I recently became re-acquainted with the IMAA (International Miniature Aircraft Association) and its publication "High Flight," which features great coverage of many giant-scale events from all over the country. The quality of the photos is good (there are loads of them), and each has a caption that identifies the plane and its owner, states the plane's weight and size and rates its performance. I just joined the IMAA, and I urge any real scale modeler to do the same. Dues are only $15 a year and that even includes four big issues of "High Flight." Just send your AMA number and the 15 smackeroos to Robert Blaney*, and get with the program!

SMOKIN' MOKIS

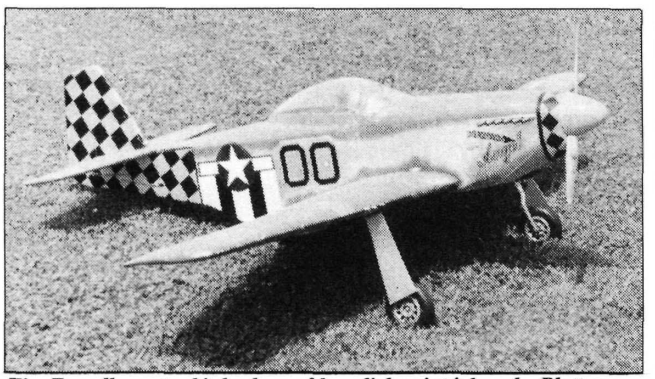
Bob Davis of Davis Diesel* is now the sole importer of the powerful Moki engines manufactured in Hungary. This is the engine that Charlie Chambers uses in his Platt Mustang, Big Beautiful Doll and that "Shame" Cramer has used for years in many of his big warbirds. Bob will be handling the popular Moki 2500cc engine, the brand new 3000 (1.8 cubes) and Moki's rendition of the big Tigre twin—the 3600cc in-line 2-stroke. Those who need all the power one and a half cubes can giveshould check out the Moki. Here's a sample of the 2500's power: it turns a Zinger 15x10 or 16x8 prop at 10,000rpm without breathing hard!



Dave Pape's Kinner features a home-built 3.46ci radial built from Forest Edwards Plans. Airplane is exact 1/4-scale.

Speaking of rpm—last month, I looked at the O.S.* 3500, 2.2-cuber, which is now available through Great Planes. A friend did some prop tests for me, and I'm happy to report that the big O.S. is a real dreamboat. It's easy to start, very powerful and relatively quiet. Right out of the box, it turned an 18x10 Zinger at 7700rpm and a 20x8 at 7500rpm!

Quite a few issues ago, I gave you a list of companies that make quality retracts for airplanes that weigh at least 20 pounds. I'm pleased to report that there's now another place to get your kicks, and this time it's in Toledo, OH. Bill Deverna* now machines custom retracts for those who need a quality unit that features an odd number of degrees of retraction. For $100 a unit, Bill will custom-make any landing-gear unit with anything from 85 to 115 degrees of swing. If that isn't enough for you, I strongly suggest that you return to the hospital that so thoughtfully let you out on a three-day pass! Best of all, Bill takes phone calls, but only from 4 p.m. to 10 p.m. EST. All three gears of my new P-61 Black Widow needed 114 degrees of swing,

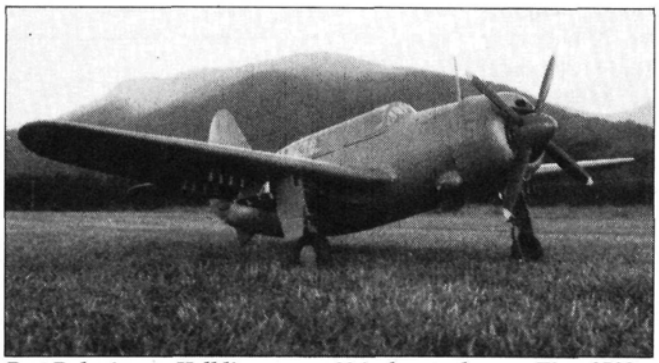


Tim Farrell, master kit-basher, adds a slick paint job and a Platt canopy to a fun-scale Mustang for outstanding results.

and someone suggested I give Bill a buzz. Well, buzz I did, and retracts I got!

GOOD INTENTIONS

In the July issue, I tried to say (humorously) why I think there has been too much fuss over Sport Scale and its rules. To recap, I suggested that modelers who have no desire to compete in the expert class should leave the rule-making to those who do. I also mentioned that Fun Scale is a great place to start scale model competition; from there, you can move up the ladder (like the rest of the contestants did) as you gain more experience. Evidently, I wasn't explicit enough, or was in favor of Fun Scale and that my gripe of the month was simply against those who try to make rules for those who are not in the same class! Is that so hard to understand? Apparently it is, since Bob from Twisp suggests (in capital letters) that I certainly should watch my six! As for not agreeing with my brand of humor, that I can understand. It's very difficult for a maniac like me to stay completely straight throughout an entire column. Yes, I really thought that everyone who read this column had a terrific sense of humor and certainly could tell when I was being stone serious and

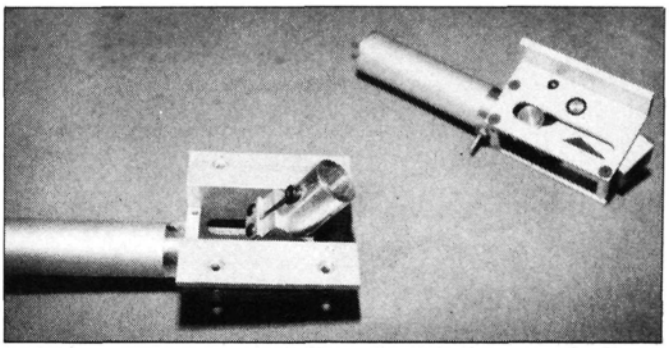


Bert Baker's new Helldiver spans 80 inches, and uses a Tigre 2500 for power. The 22-pound airplane will soon be kitted by Yellow Aircraft. (photos by Mike Richardson)

maybe I was on the wrong wavelength that day, because, to my surprise, I received a letter from Bob Hughley of Twisp, WA, suggesting that I must be some kind of "El Snobbo" if I didn't want to see entry-level scale modeling. So, I re-read my column, and it still seems clear to me that I certainly when I was poking fun at myself or at scale modelers. Obviously, I overestimated—by one!

QUIET ON THE SET!

I've never had too much of a problem with engine noise, because I always fly from fields that are a trillion miles from any human ear

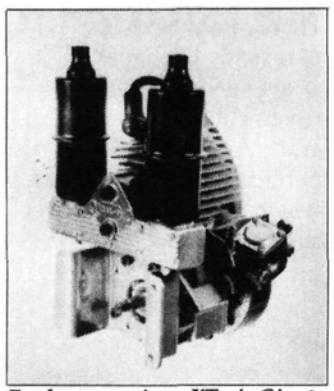


Bill Deverna's custom retracts feature handmade parts and cylinders and will support up to 60 pounds. Retracting gear leg doesn't interfere with cylinder.

other than my own or those of my flying buddies. I realize, however, that many of you aren't as fortunate and that mufflers are a must. Anyway, most engines run better with a muffler, as long as it isn't too constricting. Sometimes, a muffler that does a great job of turning down the volume makes the engine overheat; you know—too much back pressure, not enough muffler volume and up goes the head temperature. John Tatone of J'Tec* has come to our rescue with his new line of mufflers. You've probably already seen the ones meant for engines up to .90 displacement, but have you seen the new Giant Snuf mufflers? Made for larger engines, they're good-looking, trim and reduce noise with little or no power loss. I really like their high-tech look and the fact that they fit inside a scale cowling with room to spare. So far, I have one on my Zenoah* G-62 and another on a Bully. Check 'em out by sending a large SASE to John, and ask for the stuff on the Snuf!

OVERREACTING

Quite by accident, I recently discovered some unusual reactions with some of the more common finishing products. For example, it's common knowledge that if two-part epoxy paints are refrigerated, they can be used later. It turns out that this may not be such a great idea, since refrigeration delays, but doesn't stop, curing. Only mix what you're going to use and throw away the excess! Also, unless you're looking

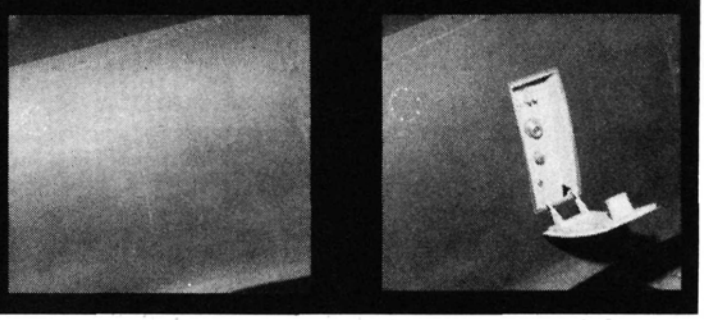


For larger engines: J'Tec's Giant Snuf muffler.

This panel holds the Robart air filler valve for the Platt retracts, a pressure monitor and a radio switch activator. To open the hatch, simply put a pointed object into hole and push. The hatch snaps open. To close, simply push on the hatch. Manufactured by Formost, these useful flush buttons are available at most hobby stores.

PROBLEM: How to turn a hatch or service panel into a working part of your model.

SOLUTION: One flush button, a piece of music wire bent into a hinge and a piece of fiberglass skin.



for trouble, never use an epoxy paint once a thin skin has formed on the surface. Leaving a mixed batch of two-part epoxy paint in the workshop overnight usually results in a hardened mess the next day. If it hasn't hardened, don't assume that you can use it, and don't remove the skin that's on the surface. You'll upset the paint's chemical balance so that it won't cure properly, or, worse, it will curdle and craze right there on your fancy paint job!

Another reaction can occur when CA glues are combined with polyester resin. Sometimes, if you attempt to fiberglass a model on which there's an excess of cured CA, the resin will kick off everywhere except where the CA is. If this happens, you can do only one thing: wipe the affected area with a strong solvent (e.g., acetone or epoxy thinner) and apply a very thin coat of 5-minute epoxy. Once a barrier has been formed, the resin will readily cure over the affected spot.

You probably know that most slow-curing epoxy resins (the 6- or 12-hour types) will cure over polyester resin, but did you know that the inverse does *not* hold true? In other words, polyester resins won't usually cure over slow-drying epoxies! The area stays tacky forever—or it did until now! We got really lucky and discovered that our new formula of Z-Poxy finishing resin—a 6- to 12-hour equal-mix epoxy—will accept K&B polyester resin after the epoxy has cured. This breakthrough means that modelers can now fiberglass aircraft with odorless epoxy resin, and repair or fill dings with polyester, which will cure in a matter of minutes. Z-Poxy Finishing Resin is available almost everywhere, and it's made by the folks who bring us Zap* glue.

READERS' STUFF

This month, I'll tell you about a trio of models built by some "Sporty Scale" fans. The Kinner Sportster is the model that you may have seen in past Scale Masters coverage. David Pape is the builder, and he's also responsible for that magnificent 5-stroke radial engine that hangs out at the front. The model spans 117 inches and was built from DGA plans.

Next, is Bert Baker's new scale design—the venerable SB2C Helldiver. This is Bert's first model for a long time, but word has it that the rights have already been sold to a kit company. Last, but certainly not least, is the infamous Timothy Farrell. This time, he grabbed one of Jim Meister's Fun Scale Mustangs (the new 90-inch job), and he turned it into a work of art. It weighs only 16 pounds, and Timothy hung a Zenoah G-38 on the firewall. Performance is totally radical and ultra-predictable! Tim says that the Stang is a fabulous flier; it goes where he wants it to go, does what he wants it to do and does it all perfectly. I say it looks great for a model that was built in three weeks of spare time, don't you? Look for the Mustang in semi-kit form from Fun Scale*, and send an SASE for more information on this great, entry-level, giant-scale airplane.

TOP GUNNERY

Here's more information on the 1991 Top Gun Invitational that will take place on May 2 to 5, 1991. It will definitely be held at Florida's West Palm Beach Polo Club, from which the nearest airport is Palm Beach International. The Club has 120 available rooms, and there are many other places in which to stay. So far, about 46 expert pilots have entered the contest, many with aircraft we've never seen before.

Team Scale will be featured again, and anyone who wants to participate in Team may be considered simply by sending me the names of his team members, details on the aircraft you'll be flying and a brief description of your contest experiences. We're still looking for a cooperative airline to give us a reasonable fare. For the first time, we may have a national beverage com-

(Continued on page 116)

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We think many of our readers have ideas that are worth sharing. How many times have you read an article and said, "I could do that!" or "That's not the only way to do that; my way is easier!" Could be!

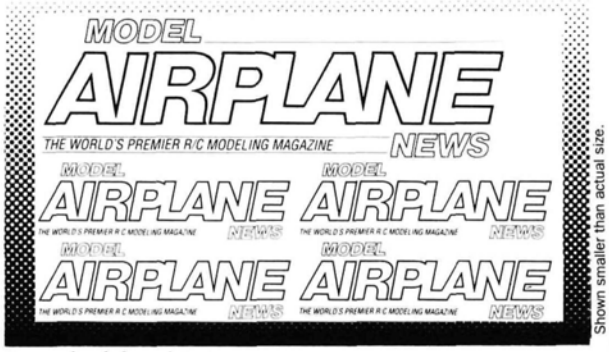
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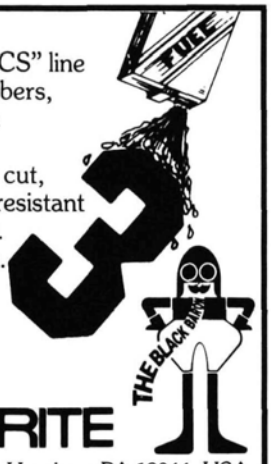
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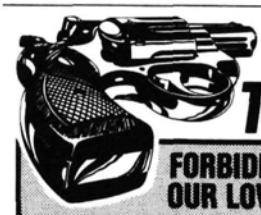
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OPTIMIZED ELECTRIC

(Continued from page 53)

wide enough to fit flush between the aft sections of the left and right ribs along a horizontal line drawn between the leading and trailing edges. The center rib must be trimmed to allow room for the motor deck and gearbox.

To cradle the motor, I glued angled stock to the deck. I also ran a wire under the deck and up on each side of the motor, where hooked ends allowed me to secure it with rubber bands.

Position the motor and gearbox so that the fully extended folding prop has between 3/8 and 1/2 inch clearance from the trailing edge. (For proper balance in the 035 version, the motor must be mounted slightly further inboard, and the receiver battery must be moved forward and placed above the motor pack.) Centrifugal force on the blades during flight ensures that they won't fold forward and hit the wing. Make sure that the prop faces the plane!

The Leisure gearbox can be mounted directly onto the Astro 05 cobalt using standard 3/8-inch-long 4-40 brass screws and lock washers. I did have to trim about 1/16 inch of plastic off the gearbox to allow enough clearance for the tip of the Astro motor shaft. Be sure to put a little grease on the gears.

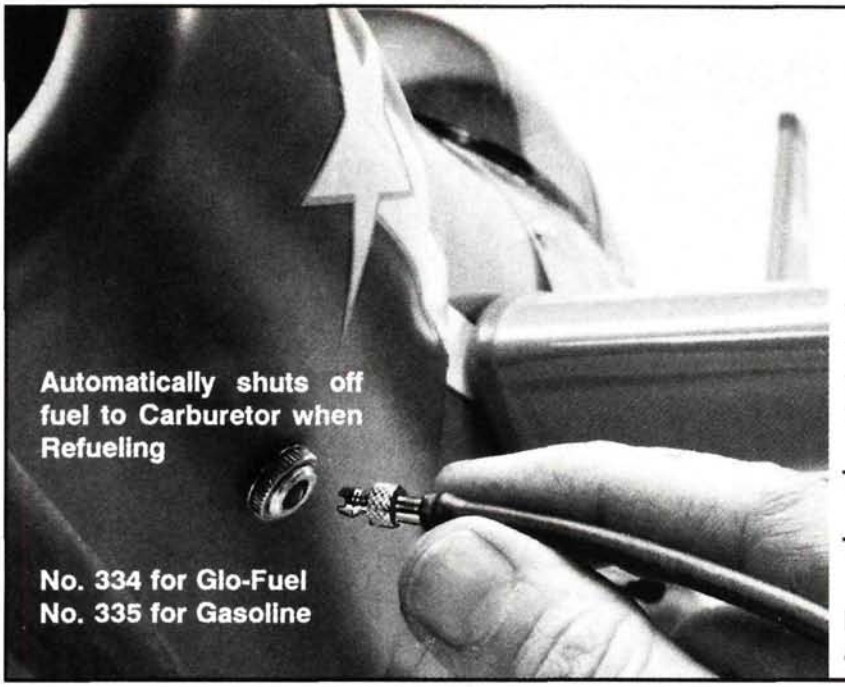
Glue spruce or hard-balsa 1/8x1/4-inch strips along the upper surface of the cut-out ply edges to which the gearbox will be bolted. After checking the alignment of the motor and gearbox on the motor deck, drill two mounting holes, check for positioning, and strengthen the inside of the holes with a small amount of CA.

To bolt the gearbox to the plane, I used brass 4-40x1/2-inch screws with lock washers on both sides. They allow just enough clearance, and to prevent them from working loose, I "topped off" the nuts with locking compound.

INSTALLING THE ELECTRICS

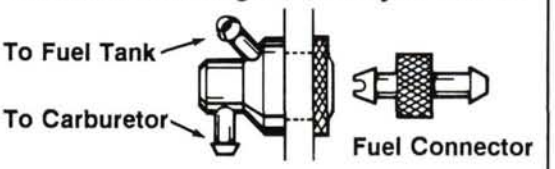
The electrical-system components fit as if the plane had been designed with them in mind! In the 035 configuration, I put three 1250mAh cells into each front bulkhead and tucked thin foam rubber snugly around them. In the 05 version, I put three 1200mAh batteries into the right forward bulkhead and four into the left. I inserted the foam-wrapped radio receiver in the right bulkhead against the batteries, and it protruded onto the forward deck. The

(Continued on page 67)



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OPTIMIZED ELECTRIC

(Continued from page 62)

speed controller went in front of lite-ply webbing that was installed across the servo deck, and I taped the 250mAh radio battery behind the webbing, in front of the elevator input servo.

To provide airflow over the speed controller's heat sink, I installed a small air scoop in the wing panel on the underside of the wing. Incoming air is directed through a passage in the servo decking and webbing against which the speed controller is mounted. Use an arming switch between the motor and the speed controller so that you can check the radio system safely, i.e., without any risk of the propeller accidentally coming to life.

The positive (red) and negative (black) connectors that join the motor and speed controller must be joined red to black—the opposite of the current flow's normal polarity. This makes the motor run in

(Continued on page 73)



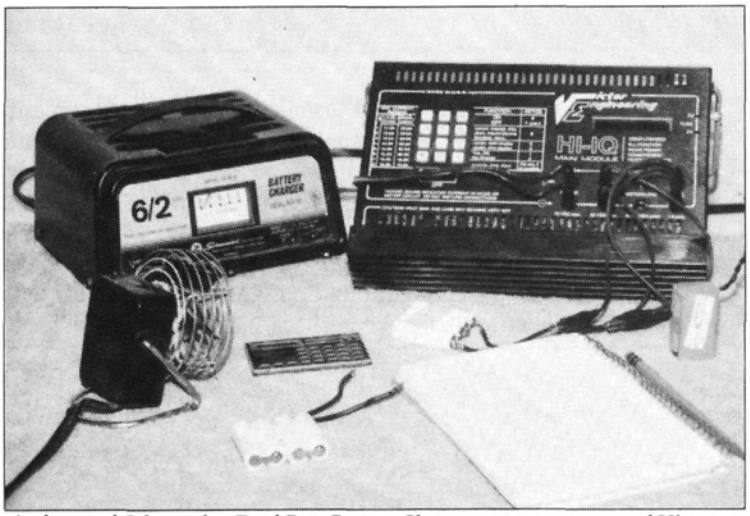
QUANTUM'S

Nickel-Hydrogen + Batteries —

TWICE THE CAPACITY AT ONLY 1/3 MORE WEIGHT; WILL Ni-Hy-POWERED ELECTRIC FLIGHT BE THE NEXT ADVANCE?

by LLOYD SCHULTZ

I'M SURE THAT THOSE who practice electric R/C flight will agree that we can achieve good performance or extended duration, but rarely both, and that battery technology is the key limiting factor. After all, the motor battery pack accounts for at least 33 percent of a plane's gross flying weight. A significant increase in mAh produced for each ounce of battery weight could change everything. With a big enough jump, electric flight could be equivalent in performance/duration (dare I say superior?) to gas-powered flight.



Author used Schumacher Dual Rate Battery Charger as power source and Victor Engineering Hi-IQ unit to cycle batteries during evaluation.

You can imagine then, how excited I was at the opportunity to test some experimental nickel-hydride (NiH or "Ny-Hy") cells from Quantum Batteries*—a subsidiary of Gold Peak. Ny-Hy cells (sometimes referred to as nickel-metal-hydride cells) promise to provide nearly twice as many mAh per ounce as Ni-Cds. My first thought was, "What will this mean for electric flight?"

While I waited for the sample Ny-Hy cells to arrive, I smoked my trusty calculator for a few evenings. How would you like to fly an Electrostreak wide open for 7 minutes per charge, or to fly an Aero-Lectric for 18 minutes, or a Challenger nonstop for 25 minutes without thermals? Flight times like these should be possible if Ny-Hy technology (which is in prototype form, as I write this) lives up to its promise. Heady stuff, no? We could approach this from another angle and maintain the durations we now have, but fly a 300W Fast Eddie or Race Rat!

Calculations done, I waited for the sample cells to arrive. Here's how I decided to test them:

- Since these were AA cells suitable for receiver or transmitter duty, I'd make up three 4-cell packs (sorry, not for motor packs, *yet*).
- To define limits: pack one would be used to test from a .1-amp charge and a .5-amp discharge rate, up to whatever charge and discharge rates caused venting.
- Within the limits established with pack one, pack two would be used to perform test cycles to learn cell characteristics like charge/discharge temperatures and peaking traits. This would probably ruin pack two also, as it's abusive—much worse than what we'd do to a transmitter or receiver pack in normal R/C use.
- Pack three would be used to perform much longer cycles at amp rates roughly equivalent to actual R/C use of Ny-Hy cells in a receiver pack; namely a .2-amp charge rate and a .5-amp discharge rate.
- For comparison, I'd buy a new 4-cell 500mAh Ni-Cd pack (*same size and weight* as the Ny-Hy cells) and subject it to the same test as pack three.



Quantum's new AA Ny-Hy cells contain no cadmium and offer approximately twice the capacity of their Ni-Cd equivalents.

I called Peter Steinmetz at Quantum to get some specs and to pick his brain about what to expect. He said the initial cost of Ny-Hy cells is expected to be $5 or less and that the price should go down as demand increases. They should be available this fall.

Ny-Hy cells have a higher self-discharging rate than Ni-Cds, so they *must* be topped off before use. The cells I'd be getting would be from the second batch of prototypes, and there's eight weeks between batches, as improvements are made before a new production run is made. My cells would be size AA with a rate of about 1000mAh. Peter had obtained 1100 to 1200mAh from some cells in the batch I'd be testing. Sub-Cs are coming, and they'll be rated at about 3600mAh, but they won't be suitable for motor packs for a while, since they haven't yet been engineered for the high-stress use we give them to power motors, let alone fast-charging.

The specs Peter sent for these cells include:

—contain no cadmium, mercury or lead (a major environmental benefit)
—high-energy density
—absolutely no memory effect

—rating of 1000mAh
—nominal voltage of 1.2 volts per cell
—discharge end voltage of 1.0 volt per cell

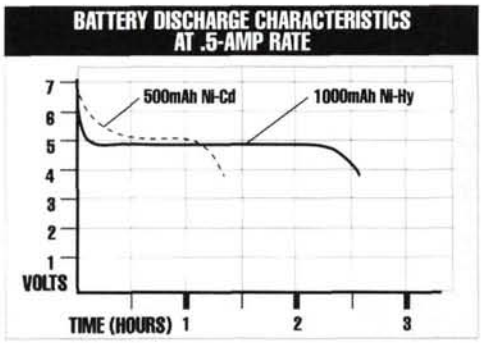
The cells arrived, and I quickly made up packs one, two and three and attached the first pack to the Victor* Hi- IQ cell analyzer/tester.

LIMITS

First, I wanted to determine their limits for charging and discharging. It took a 3-amp charge or a 4-amp discharge to vent the cells, and I vented some in pack one both ways. (As they vented, I replaced them with fresh cells.) Working up from the slowest rate, I discovered that these cells wouldn't fully charge at less than a 2-amp rate, so I had to charge between .2 amp and 2.5 amps, and discharge at less than 4 amps.

CHARACTERISTICS

What are these cells like? About one third of the way through a charge, they're noticeably warm. They're cooler than peaked Ni-Cds, and they stay at about that temperature until "entering the peaking phase." Ny-Hy cells have a hard time peaking. They don't display a drop of .2 volt when they peak; there's a much slighter drop. Hence, a charger looking for a drop in the .2V range may not "see" the peak. I made up three packs and charged them 33 times, but I was only able to get them to peak twice. At all other times, the Hi-IQ aborted the charge well into a peaking effort. I identified this at about 6.38 volts, which is also the point at which the temperature increased to slightly hotter than a peaked Ni-Cd. Also, peak or not, the highest voltage that I observed during charge was 6.48.



Thinking that my Hi-IQ might be the culprit, I tried half-a-dozen peaks on a Tekin* BC210 reflex charger–some at normal charge and someon reflex. I never peaked on the Tekin. The biggest surprise was that even at a 4-amp discharge, *these cells didn't get warm*, and this was true of the vented cells mentioned earlier.

Like Ni-Cds, the higher the charge/discharge rates, the lower the ultimate mAh value achieved. That is, if I charged or discharged at a high rate, the mAh I could extract during the Hi-IQ discharge test cycle was low. The mAh achieved with Ny-Hy cells varied much more with the charge-discharge rate than that achieved with the Ni-Cds.

ACTUAL RESULTS

I observed mAh varying from a low of 548 on pack one (when charged at 3 amps, before the cycle on which venting occurred) to a high of 943mAh from pack three when charged at .1 amp. An overnight trickle on a standard normal receiver charger might do better, but I doubt it, since even .1 amp wouldn't top off these cells.

On several .5-amp discharges for pack three, simulating normal receiver duty, I plotted the voltage at 30-minute intervals. I then did the same for the 500mAh Ni-Cd pack. I wouldn't call these observations conclusive, but it seems that the Ny-Hy cells drop to a plateau faster, and drop off the edge of the plateau more abruptly than Ni-Cds (seethe graph). The duration on the plateau approximately doubled.

The Ny-Hy cells weigh an average of 1.37 ounces. I determined this by weighing 20 cells and dividing their total weight by 20 to get as accurate an average as possible. A 500mAh Ni-Cd cell weighs about .99 ounce.

One thing seems clear: whether it's nickel-hydride, complex manganese oxide, melinium or something as yet unknown to the public, battery technology seems poised for a performance leap that could filter down to electric flight surprisingly soon. Now, about that beefed-up floater I was going to stuff with Ni-Cds to win the '92 KRC all-up, last-down contest...

**Here are the addresses of the companies mentioned in this article:*
Quantum Batteries, *2772 Loker Ave. W., Carlsbad, CA 92008.*
Victor Engineering, *380 Camino de Estrella, Ste. 170, San Clemente, CA 92672.*
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The proper way to launch the Race Rat. This model requires a good strong heave!

G•R•A•U•P•N•E•R

RACE RAT

by JOHN LUPPERGER

A lightning bolt may outfly this electric racer, but few model aircraft will beat its speed



You can see the Race Rat's size as the author proudly shows off the finished model.

THE GRAUPNER RACE Rat was designed by the well-known German designer, Werner Detweiler, who has created many electric models, including the Aeronaut F3E Sinus. The Race Rat is an electric pylon racer—everything about it says speed! Werner won the World Championships with the original Race Rat, which was slightly smaller than the kit version. He flew it against a race-winning Quickie 500, and the result was a dead heat (pretty impressive for an electric on only seven cells!).*

THE KIT

Owing to its careful packaging and low parts count, the kit arrived in good shape. The biggest piece, the Graupner Perfekt molded-plastic fuselage, has an integral vertical fin. A small bundle of wood for the wing, a sheet for the horizontal stabilizer, a clear canopy, a pilot figure, a tube of cement and the basic hardware completed the package.

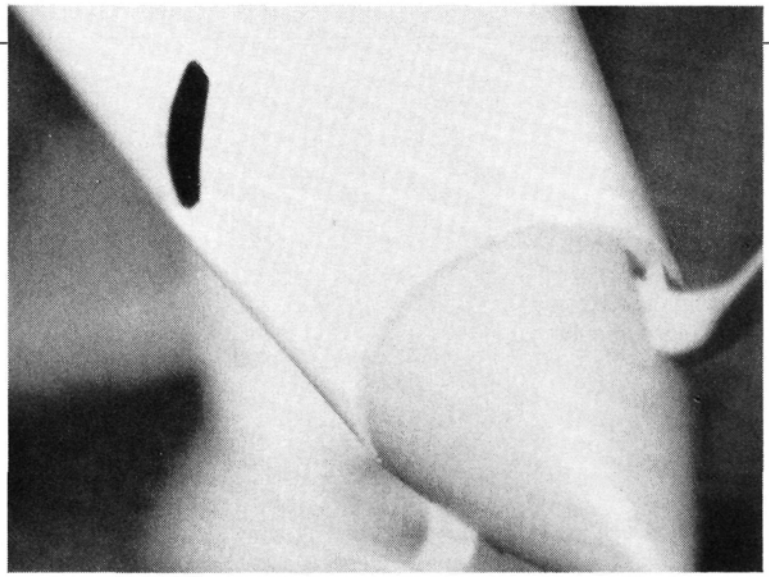
The one-sheet plans show the correct locations of the propulsion system and the radio gear. Every part is numbered and clearly shown. A second sheet includes 11 construction photos, and an exploded line drawing shows the complete model. The instructions are on a third sheet. By following the plans, line drawings, photos and instructions, construction is straightforward and relatively easy for an experienced modeler.

CONSTRUCTION

It's recommended that the parts for each step are prepared and on hand before starting. This is good advice that will prevent you from using the wrong wood at the right time! The die-cut balsa was above average, but as is usual with European kits, the plywood parts had to be freed from the stamped sheets with a knife.

First, prepare and mount the firewall. Drill pre-marked holes into the firewall and tack-glue it to the motor. Glue this assembly into the fuselage, establishing its final position with reference to the spinner. Cut open the air intakes and smooth their edges with a file. Next, mount the wing hold-down web into the wing opening under the fuselage cross-brace. For reinforcement, glue the hold-down dowel doubler into the front of the opening behind the plastic.

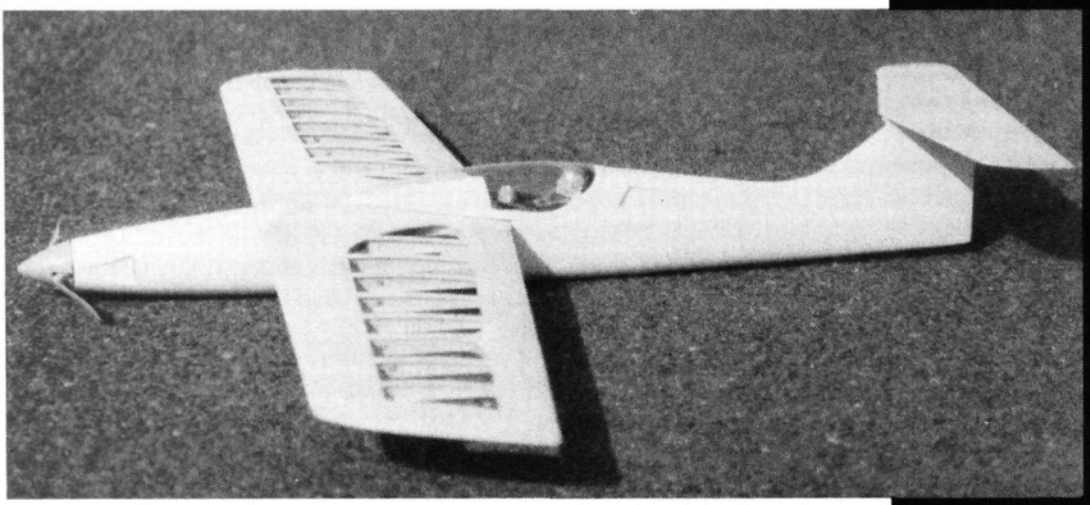
The elevator servo tray is made of four lite-ply pieces that are used to mount the servo on the side of the fuselage and capture the eleva-



The NACA-style scoops feed plenty of cooling air into the fuselage without creating extra drag.

tor cable. Install the outer cable tubing and glue it into place. Although the plans don't mention it, to prevent it from bowing, be sure to bond the outer tubing to the inside of the fuselage where it touches it. Save the excess outer tubing for later.

The wing construction is confusing in places…*so take your time!* The terminology might throw you off, so don't glue anything until you're sure of where it goes. Start by pinning the lower sheeting to the plan. You must now decide whether or not to incorporate the spruce spar cap that's recommended if you plan to do high-G maneuvers. If you only use a ferrite motor and plan to sport fly, you can build the wing without the spruce; the D-tube section with shear webs will be strong enough. If you use a high-performance cobalt motor, use the spruce spar cap for extra strength. The spruce spar is only shown in one rib



Even before being covered, the Race Rat looks fast. It almost has a scale pylon-racer appearance.

side-view, and because of its thickness, you barely notice it on the drawing. Be sure to position the spar first, and then position the capstrips. Glue the shear webs and ribs to the bottom sheeting and spar.

Next, glue the plywood center reinforcements and dowel block into the center section, and then glue the top sheeting and spar to the ribs. Finally, glue the leading and trailing edges and the wing tips into place and fit the ailerons. Drill the wing-dowel hole in the leading edge, and drill the wing-bolt web hole in the fuselage using the wing as a guide. Glue the bolt-guide tube in the fuselage between the wing-bolt web and the bottom of the fuselage. In the bottom of the fuselage, drill a hole through which the wing bolt may pass. You can attach the wing without any protrusions on its outer surface.

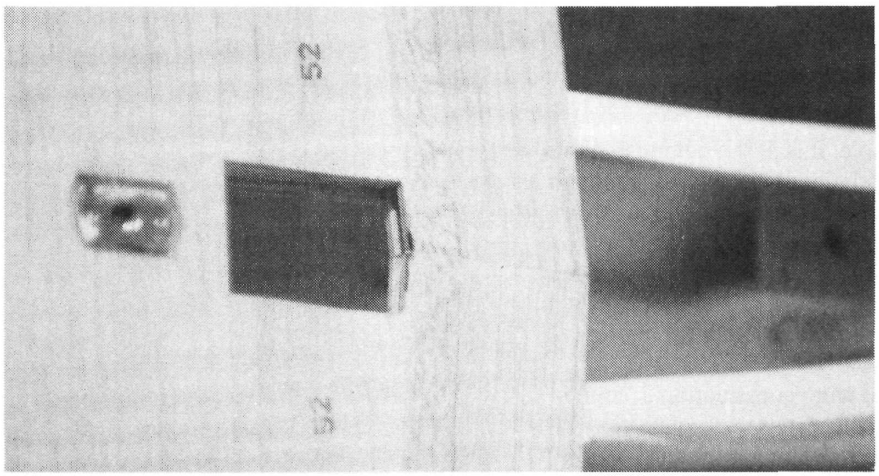
Glue the plywood aileron tray to the wing and install the aileron linkage. The bearing tubes for the ai-

SPECIFICATIONS

Type: Pylon Racer
WingSpan: 39 inches
Weight: 2 pounds, 4 ounces
Wing Area: 271 square inches
Wing Loading: 19.1 ounces per square foot
Power Req'd.: Graupner Speed 500 BB Race VS
Propeller: 6x6 Graupner Scimitar Folder
No. of Channels Req'd.: 3 (aileron/ elevator/ speed controller)
Suggested Retail: $124.95
Features: One-piece plastic fuselage with integral vertical fin; complete hardware and accessory package, including: canopy, pilot figure, wood spar material, sheeting and cement.
Comments: The Race Rat is a high-quality, precision engineered product specifically designed for high speed pylon racing. Construction is straightforward. High wing loading requires a firm hard launch; flight is stable and predictable for a craft of this type.

leron horns are made of the leftover, outer, pushrod tubing. Cut a recess for the bearing tube, bend the aileron horns and glue them in place into the trailing edge. Notch the ailerons so that they'll accept the aileron horns, and sand the entire model to prepare for final assembly and finishing.

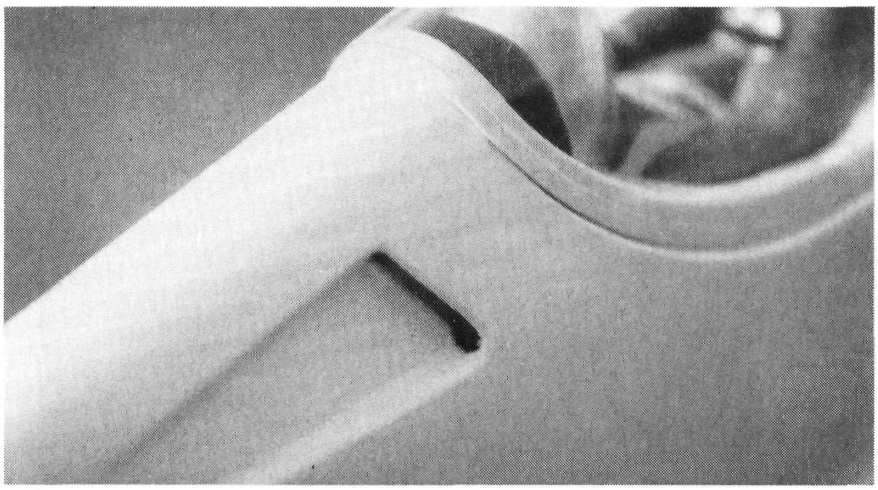
...although its speed was much greater than before, the model seemed to be more stable, and it was easier to fly.



The metal wing nut keeps the wing secured to the fuselage with a nylon bolt that passes through the bottom of it.

FLIGHT SYSTEM

To power the Race Rat, I used the Graupner Direct Drive Speed 500 BB Race Ferrite motor and prop combination and a 7-cell 900mAh battery pack. This unit comes with a 6x6 scimitar folding prop that's very efficient.



The air-exit holes behind the cockpit are cleanly designed and don't detract from the Race Rat's good looks.

THE FINISH

Weight is an important consideration in the Race Rat because it's an electric pylon racer; I therefore decided to leave the fuselage's finish alone. I covered the wing and stab with Hobby Lobby's Oracover, which is easy to apply, light and strong. To give the model a finished look, I applied the kit's Mylar transfers.

RADIO INSTALLATION

I chose my old reliable Cirrus* 5-Channel PCM radio with two S-133 servos, a 250mAh flight pack, and a Novak* T-1 electronic speed controller for throttle. I've used this radio setup in several electrics and haven't had any problems. Although this model is small, the radio gear fit easily.

FLYING

I had seen electric pylon racers flying and, frankly, I was nervous about the Race Rat's first flight. Besides being fast, the racers I had seen didn't look stable, so I went out to the flying field at the crack of dawn to have the place to myself. If I was going to crash, I would do it without an audience.

My fears were unwarranted! With fully charged batteries, I advanced the throttle and threw the Race Rat hard. (With that thin wing and that relatively high wing loading, you've got to get the model up to flying speed quickly.) It came down to within a few feet of the ground and accelerated. I was really surprised at the speed reached with the ferrite Speed 500 BB motor. Although this is considered to be a hot-wind motor, I didn't really expect this level of performance from a ferrite.

The Race Rat flew beautifully and required virtually no trim. It's a good thing, too, as I hadn't taken any photos. As the power wound down, I lined up for final and confirmed that the Rat had a good glide and flared nicely for an almost "floating" landing.

While the batteries were charging, I took pictures, in case the success of the first flight was just a fluke. The second flight, however, was as good as the first—with a couple of rolls and loops thrown in for good measure! The Race Rat isn't meant to be

(Continued on page 111)

OPTIMIZED ELECTRIC

(Continued from page 67)

reverse (otherwise, it would try to pull the Wing backwards!). Install a 30-amp auto fuse next to the motor for easy access.

Astro motors can be timed for optimal performance. First it's necessary to loosen the two "through-bolts" on the front end-bell. To time a motor that runs in reverse, rotate the black field housing relative to the brushes about 1/16 inch behind neutral. Neutral is the position at which the motor draws the fewest amps under no load.

FLYING

Check the radio system with the arming switch turned off. Make sure the blades are clear of the trailing edge, and ease the throttle forward until the propeller spins slowly. Rpm should be increased just before you toss the plane.

The Wing must be hand-launched carefully so that the disc formed by the propeller doesn't hit your hand. Wear a glove, and follow through with your arm. (Someone other than the pilot should launch the ship.) Remember, when an electric prop is impeded, it draws more current to overcome the resistance and will hit you harder on the next revolution if it can!

When the ship is launched, don't be too quick to pull up-elevator. The aircraft wants to gain speed, so let it fly.

For the first flight, I used the 035 Astro Cobalt, six SR 1250mAh cells and the 9.5x5 Aero-Naut folding prop. The ship flew around the field in a slow climb, albeit faster than that of a typical entry-level electric glider. When it had reached 400 feet, I attempted some mild aerobatics. A short dive followed by an inside loop demonstrated its extremely short turning radius. Onlookers were impressed by the Wing's "stealthy" look and its turn-on-a-dime flying characteristics.

With the motor off, the glide was very flat—remarkably like the unpowered glider version, but slightly faster—and the plane showed no tendency to tip-stall. The 035 coupled with the 1250 Magnum cells flew the Wing in "powered glider mode," providing essentially a means to achieve altitude. Given their lightness, these cells provide *excellent* duration, but I was hungry for more power!

After several flights, I switched to seven SCR 1200mAh cells, the standard Astro 05 cobalt motor and the Sonic-Tronic 11x7 folding prop. The increase in power was immediately obvious; the ship quickly climbed a few hundred feet. A

(Continued on page 78)

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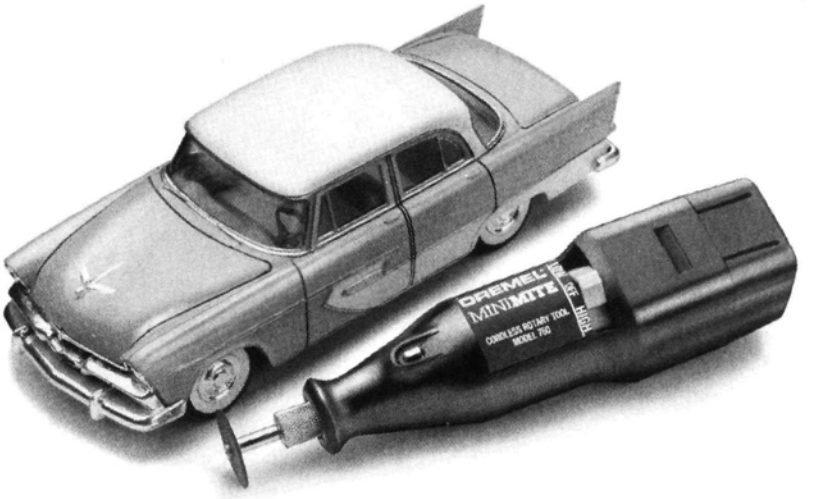
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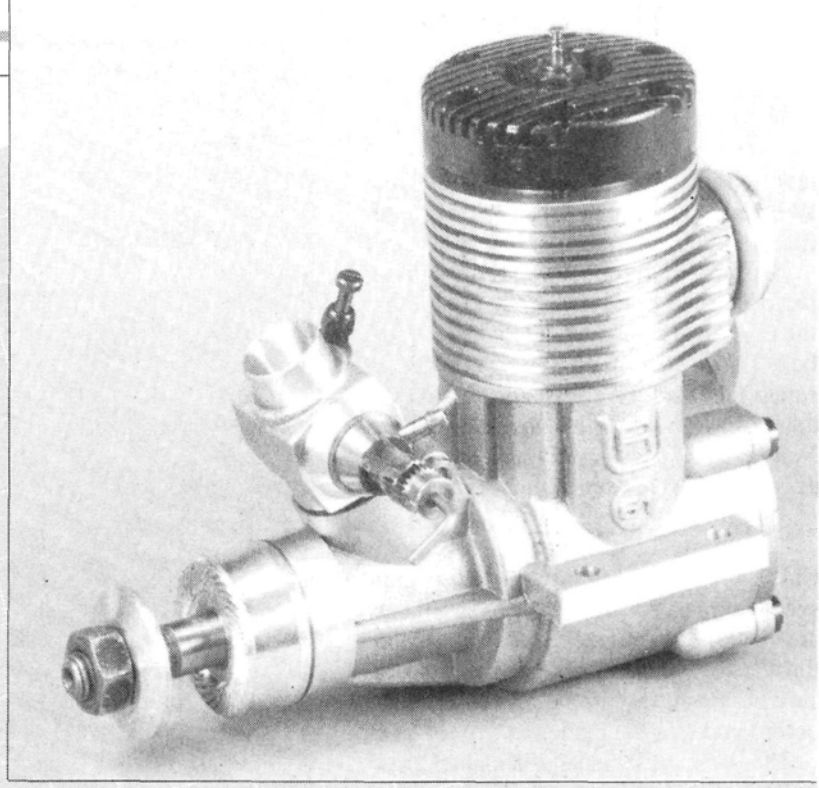
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ENGINE EVALUATION

ROSSI .61

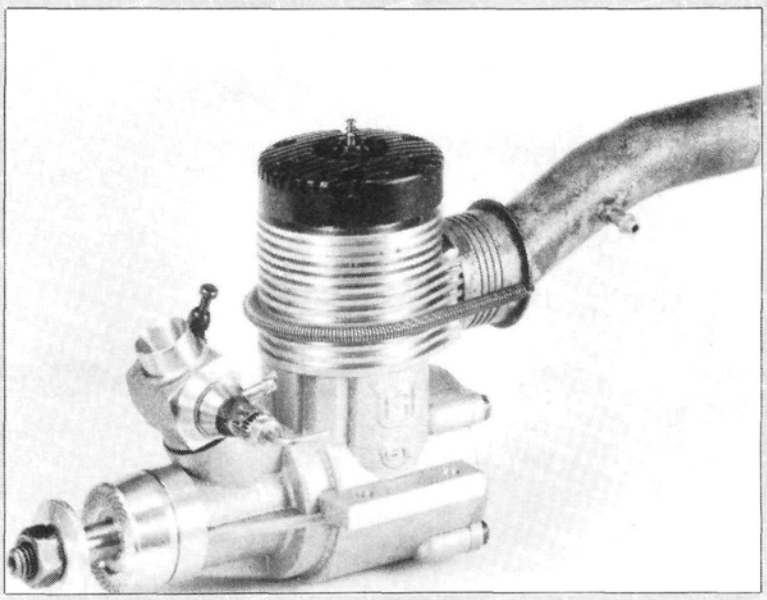


A completely new design that improves power, performance and reliability

by MIKE BILLINTON

MAINLY to satisfy FAI sound-level restrictions (96dB at 3 meters), the trend in pattern events is toward lowering rpm levels. Nevertheless, the more traditional, high-rpm engine is still popular among some competitors. Why? Some need to maximize horsepower, and others occasionally find that the reductions in sound that result from lower rpm are negated by louder, larger propellers.

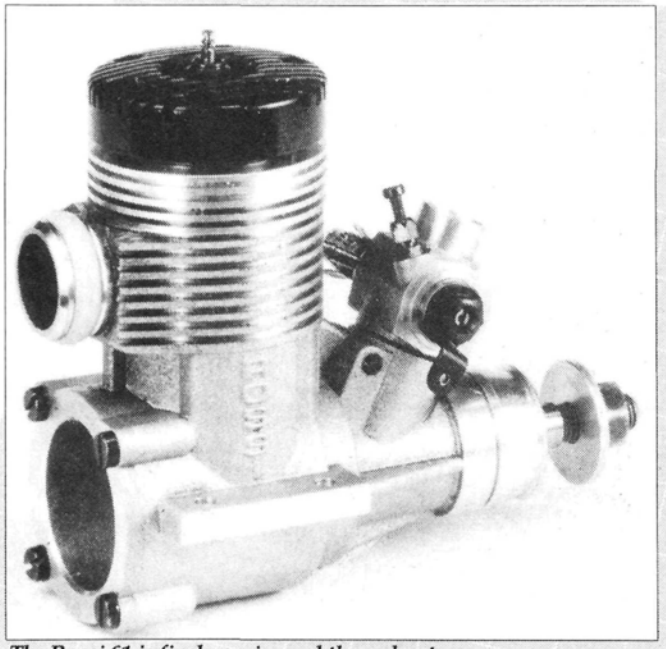
The Rossi 61, five-port, 2-stroke engine is a fine example of the new, higher-rpm, state-of-the-art devices. With a nominal rating of 2.35hp at 17,500rpm and a recommended propeller size of 11x7.5 inches (Rossi carbon-fiber), this test Rossi 61 produced slightly more than the claimed horsepower, though at the lower rpm point of 14,500. It produced these results in its out-of-the-box condition using the Rossi quiet tuned pipe with uncut exhaust manifold and uncut pipe. To reach Rossi's horsepower peak (near to 17,500), the overall pipe length should be shortened, and then, to reach this rpm when airborne, a smaller propeller that loads the engine less than the 11x7.5 inch would have to be used.



When used with a silicone O-ring, the "spring-fix" for the tuned-pipe header is fast to install and very effective .

This isn't in accordance with prevailing trends, so my other tests took another direction—toward obtaining data on the Rossi's possible longer-pipe/lower-rpm performance. This approach was productive and proved that this high-rpm engine can also be operated at lower rpm. Certainly, the modest exhaust timing of 148 degrees is a useful compromise and allows some flexibility in choosing both an rpm level and an associated pipe length.

In recognition of this, Rossi provides an exhaust header that's 2 inches longer than the standard manifold. Rossi doesn't make



The Rossi 61 is finely engineered throughout.

any specific claims about horsepower and rpm for this long-pipe configuration; in fact, their specifications don't mention the length of pipe used.

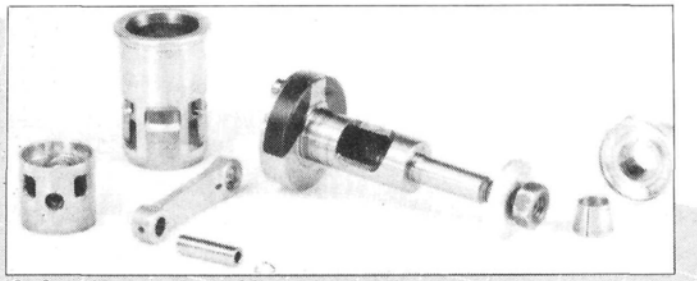
In common with other major Italian engine designs, the Rossi 61 has no supplemental fuel-pump system, but relies on the simple, and usually foolproof, pipe-pressure system to stabilize fuel flow during aerobatic maneuvers.

MECHANICAL DETAILS

The front-inducted, aluminum-alloy crankcase is a high-quality, rugged, one-piece casting. It has a built-in exhaust duct, two side main transfers and a single boost passage and, squeezed between these, there are two slim extra transfers (hence the engine's title: "3+2").

The 17mm crankshaft has almost 12mm induction port. This isn't matched by the carburetor bore, which is quite small at 8.5mm. Power output could be increased by using a carburetor with a bigger bore, but fuel draw would suffer under high-G. This is one disadvantage of the low, 1½psi, exhaust pressure available from a tuned-pipe pressure system.

The crank-web balancing cutouts are filled with carbon fiber to reduce crankcase volume and thus increase primary "pumping" compression. Standard ABC techniques are used for the piston/liner combination. The finely cast, high-silicone piston is parallel-ground to size, and the chromed liner is "taper-honed" to a slightly tight fit at TDC, and it's approximately .003 inch oversize at the bottom of the liner.



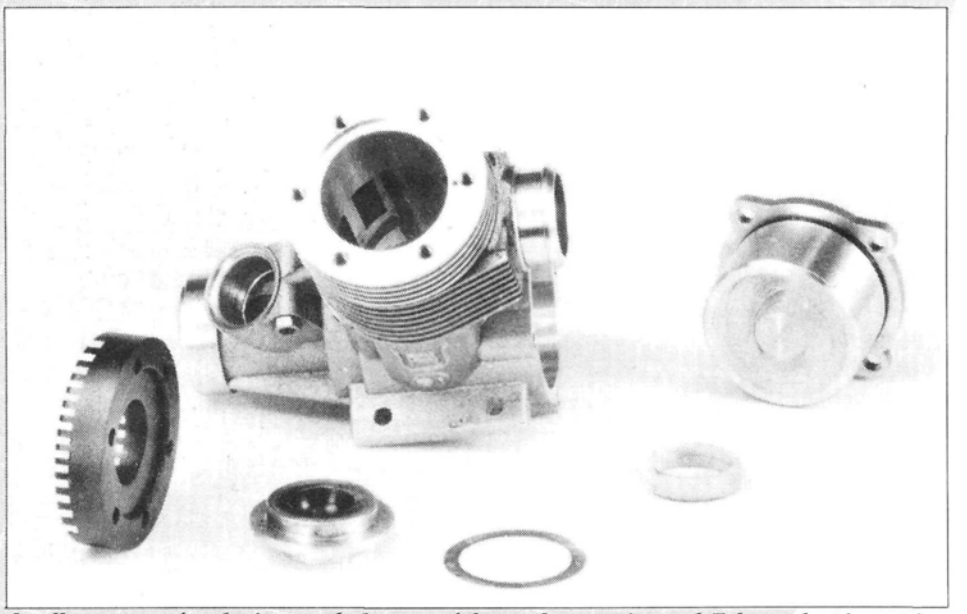
Carbon-fiber crankweb fill-ins are clear here, as are the extra transfers and matching cutouts in the piston.

The two small transfer ports effectively add flow-through area to the usual, side, Schnuerle transfers, and both the piston and the liner have matching cutouts so that these smaller parts can allow mixture to flow through to the underside of the piston skirt. This feature was the sole transfer method of, for example, the '50s Dooling 61, and it's being used again. Here, it seems to be used just to overcome the restrictive effects of the closely adjacent crankweb, which prevents the use of a normal transfer-passage arrangement that extends into the bottom of the crankcase.

The connecting rod is of the usual aluminum alloy with phosphor-bronze bushings at both ends. The wristpin fits snugly into both the little end and the piston-pin bosses, and this leaves no margin for geometric inaccuracy in the engine's construction. The resultant freedom of piston/liner fit (even when new) shows the accuracy of this Rossi product.

The cylinder head is the usual Rossi two-piece style. The combustion-chamber insert is fitted at a fairly close squish clearance of .015 inch and a fairly high effective compression ratio of 8.44:1 (both showing Rossi's preference for the use of low-nitro fuels here). In practice, it's unusual for FAI competitors to use fuels with more than 20 percent nitro—though it's allowable under current regulations.

Three layouts of exhaust-header pipes are available. All are

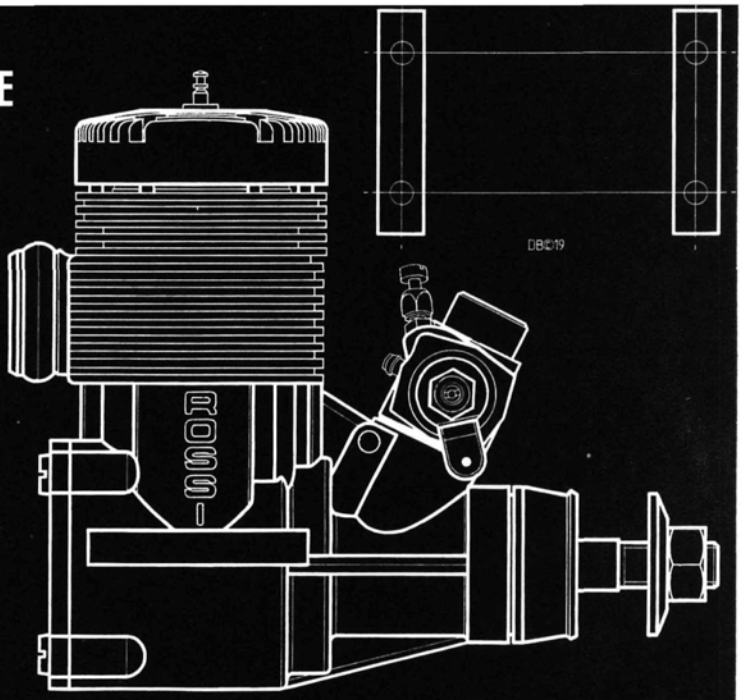


Small extra transfers don't go to the bottom of the crankcase as is usual. Exhaust duct is cast-in.

ROSSI 61

SPECIFICATIONS

75% OF FULL SIZE



Capacity	.605 cubic inch (9.91cc)
Bore	.940 inch (23.9mm)
Stroke	.872 inch (22.15mm)
Stroke/bore ratio	.927:1
Timing periods	Exhaust - 148° Transfer - 120° (extra transfers - 118°) Boost - 112°(angled up °) Blowdown - 14° Front Induction: Opens - 40° ABDC Closes - 61° ATDC Total period - 201°
Combustion volume	.95cc
Compression ratios	Geometric - 11.43:1 Effective - 8.44:1
Exhaust-port height	.250 inch (6.35mm)
Cylinder-head squish	.015 inch (.40mm)
Cylinder-head squish angle	0°
Squish-band width	.190 inch (4.85mm)
Carburetor bore	8.5mm
Crankshaft diameter	.6685 inch (16.99mm)
Crankpin diameter	.275 inch (6.99mm)
Crankshaft nose thread	8mm x 1.25mm
Crankshaft bore	.464 inch (11.8mm)
Wristpin diameter	.6mm
Connecting-rod centers	42mm
Engine height	4.08 inches (103.6mm)
Width	2.42 inches (61.45mm)
Length	3.78 inches (95.9mm)
Width between bearers	1.77 inches (45mm)
Mounting-hole dimensions	25x52.2x4mm
Frontal area	7.44 square inches
Weight (overall)	20.2 ounces (571.6gm)

sensibly engineered and can be conveniently "spring-fixed" to the engine, and they're fitted with a welded, pressure-nipple fixture. The standard and long manifolds are both offset rather than cranked to clear fuselages, and a straight header is also available. The carburetor has an aluminum body, a steel barrel and the usual main and secondary needle controls. Its construction and finish are exemplary, and it has particularly firm and positive main-needle operation.

PERFORMANCE

The renowned fit of the Rossi ABC piston/liner and high overall construction standards resulted in a smooth, short running-in period, with various propeller rpm showing little change after five minutes running.

Test 1: Open Exhaust. Fuel: 5 percent nitro/10 percent castor with 5 percent ML70 synthetic oil/80 percent methanol. Rossi no. 5 cold glow plug.

As usual with 2-stroke, tuned-pipe engines, this open-exhaust power test was more of a familiarization exercise before the tuned-pipe runs, though it does provide some sort of standard for comparing engines. The Rossi 61 showed the wide range of rpm possible from the best modern Schnuerle 2-stroke, with solid running at all points. The final top horsepower of 2.23 occurred at 21,600rpm, which is higher than the peak point of any of the "standard" 10cc engines I've tested. Strictly speaking, the Rossi 61 is an out-and-out racing engine that's operated at much lower rpm.

Test 2: Rossi quiet tuned pipe at 343mm from plug to first maximum diameter. Fuel and plug as in Test 1.

In this out-of-the-box configuration, meaningful power starts to come in at around 12,000rpm, and a peak of 2.38hp occurred at 14,500. The pipe characteristics were sufficiently "wide-band" to allow that 2.1hp was still available at 17,500rpm—a very useful performance range. This shows that Rossi has deliberately sacrificed the higher horsepower possible (with a more usual narrow-band pipe) to maximize flexibility of operation for the FAI aerobatic schedule. In this standard setup, and with pipe-pressure to the fuel tank, mixture control and throttle were solid and predictable.

Going up the rpm scale, I noted the usual slight unsteadiness in operation at an rpm point just short of where I eventually found maximum horsepower. This broadly confirms the wisdom of ensuring that the pipe isn't made too short. One school of thought suggests that getting the pipe length just right for maximum rpm on the ground will result in a pipe that's effectively slightly too long when airborne rpm rise. In this situation, there's greater certainty and flexibility of operation, particularly if rpm drop slightly for any reason. My dyno tests have frequently shown this. On the other hand (and apparently in pursuit of every last "bit" of horsepower), Rossi recommends otherwise. The company recommends that you maximize rpm/horsepower on the ground by adjusting the pipe, and then shorten the pipe by 10 to 15mm in anticipation of the increase in rpm when airborne.

Test 3: Tuned pipe now lengthened to 394mm. Plug and fuel as in Test 1.

The 2-inch increase in pipe length simulates the extra length obtained when using the Rossi "long" exhaust header. The intention is to force maximum resonance down to a lower rpm point to meet the FAI noise regulations more easily.

Performance:

Max. BHP	2.38 @ 14,500rpm	(Rossi pipe @ 343mm/5% nitro)
	2.23 @ 21,600rpm	(Open exhaust/5% nitro)
Max. torque	174 oz. in. @ 11,217rpm	(Rossi pipe @ 394mm/5% nitro)
	162 oz. in. @ 13,200rpm	(Rossi pipe @ 343mm/5% nitro)

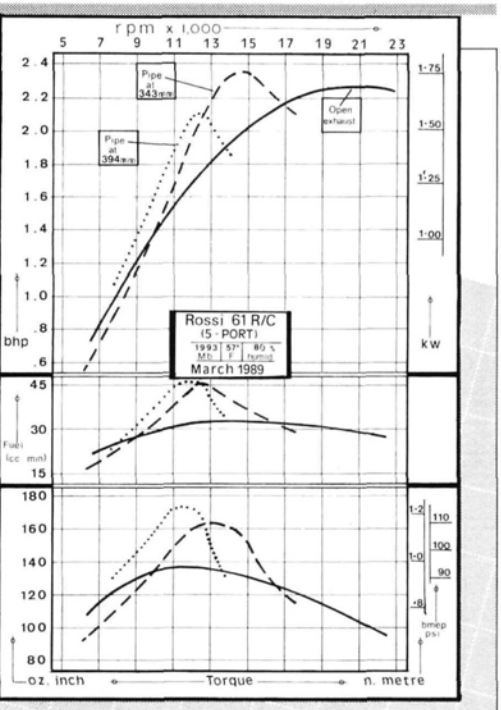
RPM on Standard Propellers:

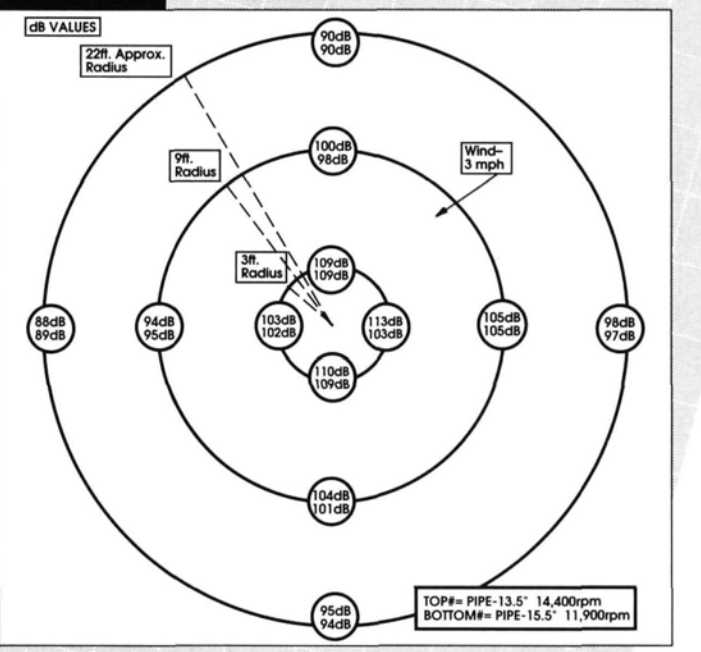
	Open Ex.	Pipe @ 343mm	Pipe @ 394mm
13x10.5 MK	7,823	—	—
13x6 MK	10.861	11,380	11,842
11.5x10.2 Yoshioka	11,200	11,900	11,900
12x6 Graupner	12,900	—	—
11x6 Graupner	14,551	—	—
10x4 Zinger	18,439	—	—
10x6 MK	15,565	—	—

Performance Equivalents:

BHP/cu. in.	3.93
BHP/cc	.240
Ounce inch/cu. in.	287
Ounce inch/cc	17.5
Ounce inch/pound	138.6
Gm. meter/cc	12.5
BHP/pound	1.88
BHP/kilo.	4.17
BHP/sq. in. frontal area	.32

Manufacturer: Rossi, Cellatica, Italy.
U.S. Distributor: Rossi USA, 214 Harvest Ave., Staten Island, NY 10310.





In this setup, maximum torque now appeared at 11,217rpm—the highest figure of the test at 174 ounce/inch. It proved that this high-rpm Rossi 61 is capable of competing in the lower-rpm race and, though not tested here, it looks capable of reaching even lower rpm (in the 10,000rpm area) and of using the 12x12-inch propellers being used by some FAI competitors. To do this, you'd have to lengthen the pipe even more—say, by another 1½ inches, but I'm not sure how effective this particular engine/pipe combination would be.

IDLING

Using the shorter "standard" pipe length and a Yoshioka 11.5x10.2 propeller allowed a 1,900rpm idle, while the longer pipe and 13x6 MK saw 1,700rpm easily achieved—in both cases with good, swift pickup to maximum rpm.

dB LEVELS

As you'll see from these results, it's difficult to meet FAI limitations on noise. This clearly shows why many competitors are vigorously pursuing even lower rpm by using rubber engine mountings, fully enclosing their engines, etc., to avoid being disqualified on the flight line.

SUMMARY

The Rossi 61 five-port is a fine example of modern 2-stroke model engine technology, which is gradually being adapted to satisfy international noise regulations. The test engine survived the tests well and looked capable of many hours of further operation at any rpm level. ■

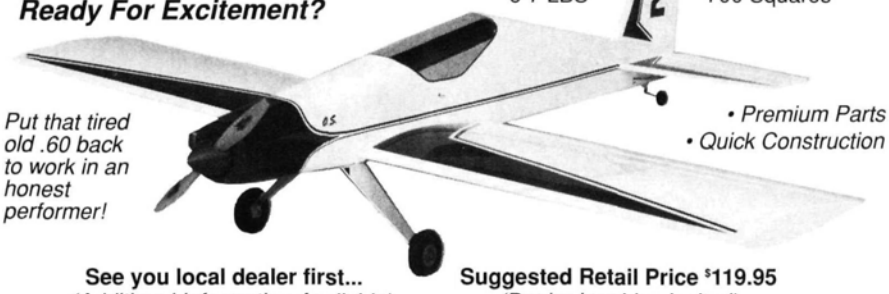
SOUND LEVELS—dB

Engine:	Rossi 61 FI R/C 3+2 (10cc)
Equipment:	Rossi quiet tuned pipe @ 394 & 343mm (15.5 inches & 13.5 inches)
Fuel:	5% nitro; 15% oil; 80% methanol
Engine position:	3 feet above hard earth
Temperature:	57° F
Humidity:	80%
Propellers:	11.5x10.2 Yoshioka 10.5x8.2 (cut down from 11.3-inch diameter)
Mean rpm:	11,900 (11.5-inch propeller) 14,400 (10.5-inch propeller)
Sound Meter:	Radio Shack's model 33-2050 set at 38 inches above the ground and pointing horizontally toward nearest sound, i.e., propeller or tuned-pipe outlet. Three distances were used: 3 feet, 9 feet and approximately 22 feet.
Meter settings:	"A" scale and "Slow" response

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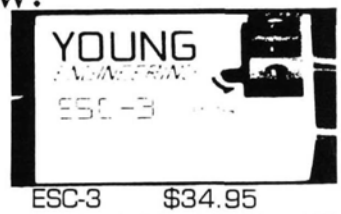
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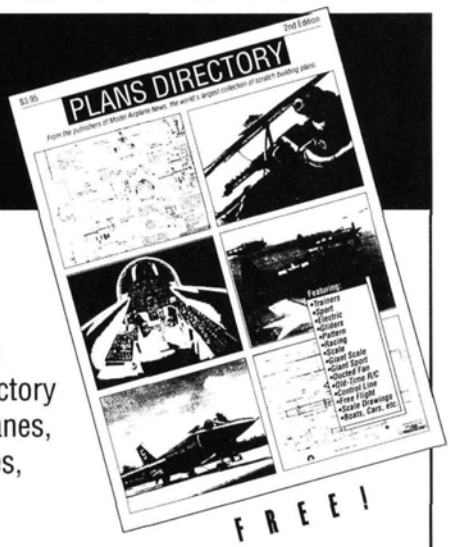
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NEXT ISSUE!

Are you into scratch-building, or eager to try? See the fantastic selection of plans in our free directory in the December issue! Sport planes, racers, trainers, bipes, float planes, old timers, jets, giant-scale aircraft—the list seems endless. There's definitely one for you to build this winter!

- ***Convert a vintage free-flight design to R/C!***
- ***Build a scale warbird for next year's Scale Masters!***
- ***Challenge yourself with a scratch-built aerobatic ship!***
- ***Create your own plans using authentic scale drawings!***

The directory contains an added bonus: a unique collection of fabulously detailed Wylam, Nye, Nieto and Larson scale drawings from the archives of Model Airplane News. The plans directory spans decades of aeromodeling history.

Look for it in the December issue!

OPTIMIZED ELECTRIC

(Continued from page 73)

moderate, gusting wind—enough to discourage slower trainers (glow or electric)—was no problem. The Wing was stable and showed tight control response in the slight chop. This was a clean, fast electric with good wind penetration. It occasionally yawed slightly when buffeted, but this was self-correcting.

A problem emerged during high-speed dives into the wind. I heard a slight groan as the built-up elevons vibrated. Pushed beyond its normal flight regime, the Wing was showing some elevon flutter! One of the nylon clevises separated from an elevon horn, but I managed to fly the ship in on the remaining elevon! To address this problem, I substituted metal clevises, rebuilt the sliding tray out of scrap servo-tray plastic to eliminate slop, tightened all linkages and checked the seal between the elevons and wing. (I still had to see how effective this "fix" would be with the 200W FAI 05.)

GREEDY FOR PERFORMANCE

On a calmer day, I "power-climbed" the Wing to about 500 feet, pulled back to half throttle and flew laps to test its endurance. After 9 minutes of continuous power, I opened it up for some mild aerobatics and again throttled back. When the juice began to ebb—well into the eleventh minute of the flight!—I brought the aircraft down. Clearly, the Wing was now out of the powered-glider and into the sport-flying category, but more power was needed to bring out its full aerobatic potential.

The next step was to install the 200-watt FAI 05 power system. I planned to increase running time by using specialized batteries—Trinity's* "Pushed" SCE 1700mAh cells. A battery pack with nine SR 1000mAh cells, which weighed the same as the 7-cell SCR pack, promised to maximize power by increasing voltage. I looked forward to testing a new 411P Tekin speed controller with circuitry designed to prolong half-throttle flight. I also planned to add "full flying, pivot-mounted" winglets (noted in the kit plans) to reduce some of the yawing when the ship came out of maneuvers.

Would a reduction in propeller diameter coupled with a CG adjustment result in a faster ship? I also wondered whether the Wing would then fly faster than the

(Continued on page 86)

FUTABA PROFESSOR 40



Flight training 101 was never easier!

by RICH URAVITCH

THERE ARE "TRAINERS" for engines of almost every size (from .049 to 2ci-displacement gas engines). They also fit nearly every budget and every taste—from the scratch-builder to the modeler who only wants to *fly*. Confronted by this huge choice, beginners might be confused, but if they do any research, they'll soon know the Futaba* name.

In the U.S., Futaba has the lion's share of the competitive R/C radio market and is known for its high quality and good service. With its reputation firmly established, the company has, quite logically, entered the airframe business. Does its reputation hold up? Let's look at its first .40-size glow-engine trainer—the Professor 40.

Now, before you start thinking that some of the floor space at the brand new Futaba plant has been occupied by balsa-processing equipment, die-cutting machinery and kit packaging tables, be advised that the Professor 40, as well as the new Akrostar, are made for Futaba by another company. When I opened the box and examined the parts, the fabrication techniques and the construction guide, everything looked very reminiscent of the "EZ" line of ARFs—a sucessful product line over the years. If that's true, the manufacturer is O.K. Models of Japan, which is also noted for high-quality products. Talk about coupling excellent reputations!

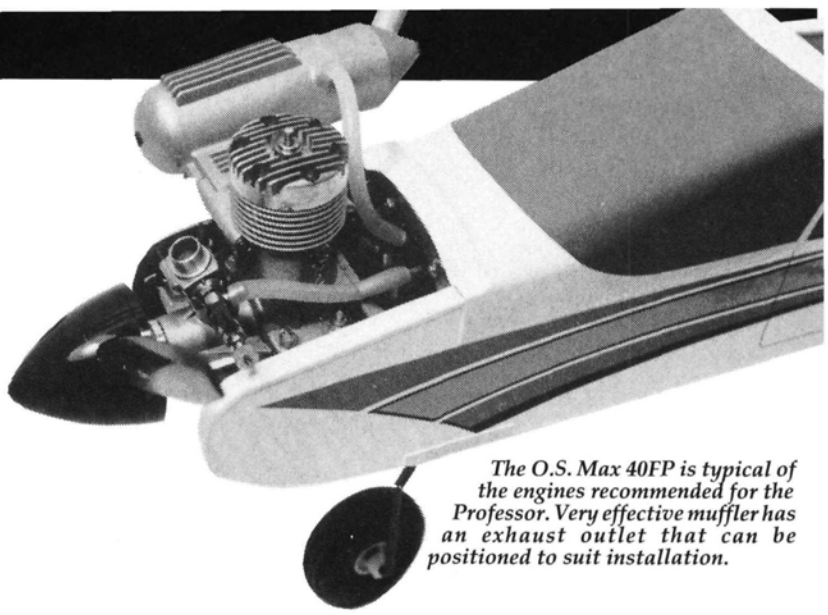
THE KIT

The Professor kit has fewer than a dozen major parts, but the smaller ones are the ones that make a difference. The hardware and accessories are included, and the only extras you'll need to get the Prof airborne are an engine, a prop, a radio and adhesives. Everything else is in the box.

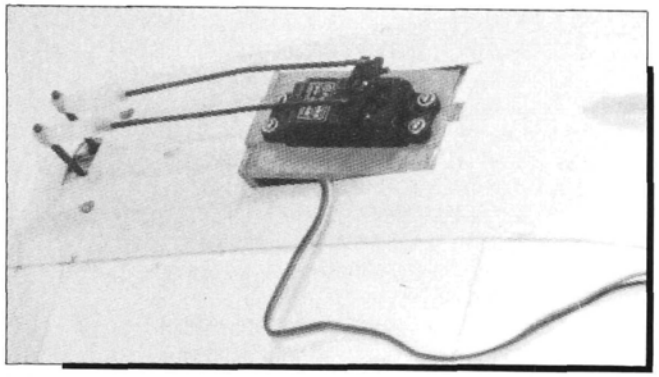
Expect to spend approximately 8 hours assembling the kit and installing the radio. The airframe components arrive built and have a foam "skin" bonded to a wooden substructure. This skin has the color and decoration already applied and protected by a clear laminate, so there's no need to finish or fuelproof.

SPECIFICATIONS

Type: ARF trainer
Wingspan: 59 inches
Weight: 4 pounds, 13 ounces
Wing Area: 542 square inches
Wing Loading: 20.5 ounces/square foot
Power Req'd: .40 to .45 2-stroke
No. of Channels Req'd: 4
Suggested Retail: $ 189.95
Features: Colorful, fuelproof finish, complete hardware and accesssory package, including fuel tank, motor mount, spinner and wheels.
Comments: The Professor 40 is a high-quality product that will give beginners to R/C flying an effective way to develop and refine their skills. It can be assembled quickly, but, owing to the materials and construction methods used, repairs may be a problem.



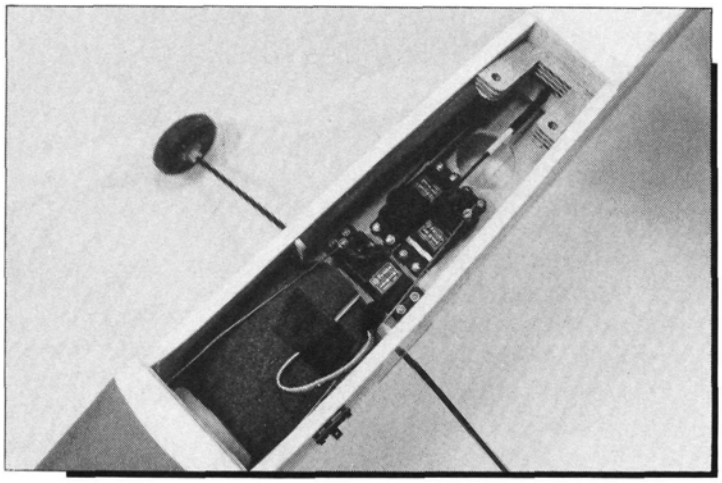
The O.S. Max 40FP is typical of the engines recommended for the Professor. Very effective muffler has an exhaust outlet that can be positioned to suit installation.



Wing center section showing aileron servo installation. Inner holes used on servo output arms to reduce throw.

The well-illustrated, 15-page construction guide contains sequenced assembly photographs, a parts list, basic flight instructions and general safety tips. It's well-organized and discusses most of the steps adequately, but it falls short in a number of areas, and this could cause problems for a novice (remember, this *is* a trainer). Too much is taken for granted: the pushrod hook-up at the nose-gear steering arm and the receiver antenna routing are nowhere to be found. There's a plywood support for the switch, and its installation is discussed, but the part isn't identified in the photos.

These may seem like small things and, to experienced fliers, they are; but to newcomers, they can be real problems. In some of the construction photos, contrast is poor, and the lightest parts are difficult to see. Again, this isn't helpful for beginners.



There's plenty of room in the radio compartment for a Futaba FP-4NBF system. FP-S-148 servos were used.

THE GOOD NEWS

You've heard the down side; now for the good stuff. The Professor's parts fit is excellent and the die-cut plywood is the best I've seen recently. The CG location is conveniently, and permanently, marked on the fuselage, so there's no need for guesswork or calculations. The tray for the servos establishes their location, but the battery pack and receiver can be shifted around for balance. With an O.S.* 40FP installed and the foam-protected receiver and battery pack stacked up just forward of the servos, my Professor balanced perfectly.

I chose a Futaba (naturally) FP-4NBF radio system—a basic, no-frills, 4-channel FM type, which has two very handy features: servo-reversing and a "buddy-box" plug. This will enable a beginner to couple the transmitter with a compatible one that's held by an instructor who can take control if the novice gets into trouble. The switch for this function is conveniently located at the top left of the transmitter, and it's spring-loaded "off." This is quickly becoming the method of choice for initial flight instruction, and it's much better than the "hot potato" transmitter toss (or grab!) that we've all seen happening between student and instructor. It's more effective and frequently makes the difference between a "save" and a costly crash. I find it most effective when a student is starting to learn his traffic pattern and landing-approach technique (when the altitude leaves less margin for error).

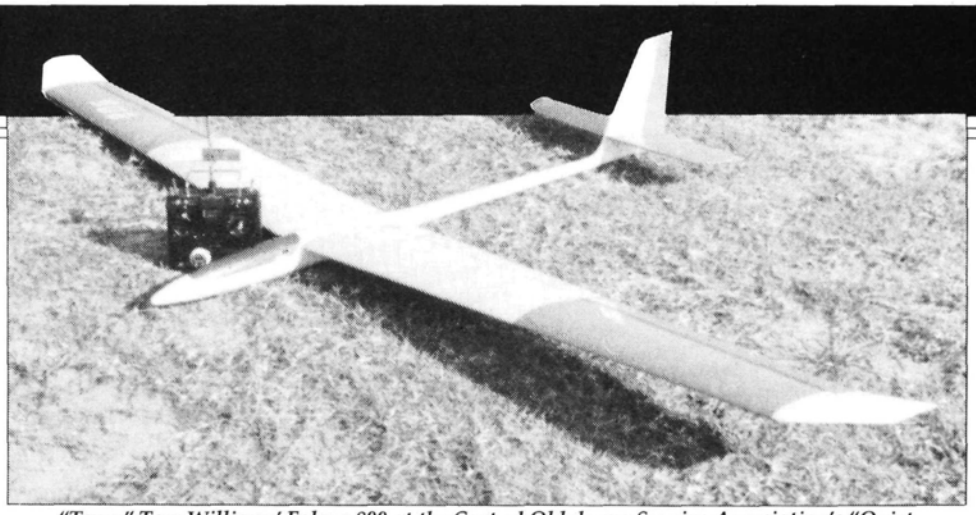
PROF PERFORMANCE

For its first flight, the Prof and I had the company of my father-in-law, George Nail—a novice flier and probably just the kind of customer Futaba had in mind for the Professor 40. George is enthusiastic and is picking up the hobby remarkably well. He has been flying a Midwest* AeroStar 20, so I thought he could graduate to a slightly larger airplane—one that would handle a greater variety of wind conditions.

On the first flight, I noticed that both the nose-wheel steering and the ailerons were much too sensitive and would make flying difficult for a novice. Apart from that, the Professor showed great promise as a good flier. To desensitize it, I moved the nose-gear pushrod to the inside hole on the servo and did the same thing to

(Continued on page 90)

QUIET FLIGHT



"Texas" Tom Williams' Falcon 800 at the Central Oklahoma Soaring Association's "Quiet Please" Fun Fly. The Falcon might be the perfect aircraft for Sportsman Multi-Task flying.

by JOHN LUPPERGER

New twists on old contests!

EVEN IF YOU DON'T fly in competitions, you can benefit from the experiences of those who do. Competitors often search for a cleaner design, better materials and equipment, or an innovative flying technique to get the winning edge. This information eventually trickles down to the "Sunday fun fliers," who then find the enjoyment of their hobby elevated (no pun intended!). This month, my column deals with several types of competition—some new, and some new twists on old subjects.

SPORTSMAN MULTI-TASK SOARING

Because of the logistics involved in running them, true F3B contests are unlikely to attain the popularity here that they enjoy in Europe. Therefore, many individuals have tried to promote what some call a "watered-down" version of F3B—Sportsman Multi-Task.

"Watered down" refers to some of the rules proposals made to encourage participation by more people. Suggestions include a 75-ounce maximum weight, $150 maximum kit cost, 12-ounce maximum wing loading, a cap on speed and laps (e.g., under 30 seconds receives the maximum score), or even the elimination of speed rounds in favor of distance and duration tasks only.

Originally, Sportsman Multi-Task was meant to generate interest in F3B, but I think it has become an alternative to thermal duration, "pound-the-spot" contests. Many people think that the restrictions that are meant to "equalize" the competition will ultimately hurt it. After all, competition means a fight in which to excel, a battle to win. If you make everything equal for everyone, there isn't a competition anymore! This is why there are so many designs available and so few one-design contests. Too many restrictions stifle creativity and kill interest.

SOLUTIONS?

Is there a way to make Sportsman Multi-Task work? I think so, but the answer lies in the scoring, not in restrictions. Several years ago (before there was a Sportsman Multi-Task), my club wanted to try an F3B contest. As CD, I felt that it was imperative to make the event fair without placing restrictions on the aircraft flown, but to still reward those who put in the extra effort to win. We devised a scoring method that gave everyone a chance.

The "Speed Task" was flown first. The contestants had two, back-to-back attempts at the course. This allowed them to make adjustments according to their first runs, and, in most cases, their second runs were quicker. The pilots' faster times counted; these scores were added together, and the total was divided by the number of contestants. This average time was then designated to be worth a certain number of points. If there's a wide range of aircraft types (everything from Oly IIs to Falcon 880s), then the average time might be assigned a value of 900, or even 950 points.

SCORING

Each pilot who posts a time *above* the average receives the average score (e.g., 900), plus his man-on-man percentage of the best time. For example, if the best pilot flies a 19-second speed run and the next-closest pilot hits a 22, his *normal* score would be 864, compared with the top pilot's 1,000. (Divide 19 by 22—which equals .8636—round up to three places, and drop the decimal.) By the *adjusted* scoring method, however, his score would be 968, or 86.4 (his score expressed as a percentage of the best time), plus 900 (the average value) and rounded to a whole number.

Any pilot with a time *below* the average is scored against the average as if *it* were the best time. He then receives that percentage of the lowest score above the average. Let's compute the score of a pilot who flies a 42-second run (which is below the average of 36). Divide 36 by 42 to get his percentage of the average score (.857), and multiply by 100. Now multiply this figure (85.7 percent) by the lowest score above the average—in this case, 958—for a final score of 821.

F3B/SPORTSMAN MULTI-TASK CONTEST SCORING EXAMPLE

SPEED RUN in Seconds	Normal Man-On-Man (best time divided by time)	Adjusted Score: 900 (avg.) plus % of 100:
:19	1000	1000
:22	864	900 + 86.4 = 986
:23	826	900 + 82.6 = 983
:24	791	900 + 79.1 = 979
:32	594	900 + 59.4 = 959
:32	594	900 + 59.4 = 959
:32	594	900 + 59.4 = 959
:33	576	900 + 57.6 = 958

:36 AVERAGE TIME (Total time—435 seconds—divided by number of contestants—12)

		% of Average Time multiplied by 958
:42	452	85.7% x 958 = 821
:48	396	75.0% x 958 = 719
:60	317	60.0% x 958 = 575
:68	279	52.9% x 958 = 507

LAPS	Normal Man-On-Man Score (laps divided by best laps)	Adjusted Score: 900 (avg.) plus % of 100
20	1000	1000
18	900	900 + 90 = 990
18	900	900 + 90 = 990
17	850	900 + 85 = 985
16	800	900 + 80 = 980
16	800	900 + 80 = 980
16	800	900 + 80 = 980

14 AVERAGE LAPS (Total laps—167—divided by number of contestants—12)

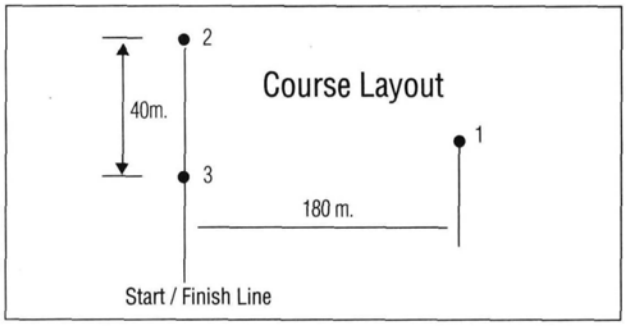
		% of Average Laps multiplied by 980
12	600	85.7% x 980 = 840
10	500	71.4% x 980 = 700
10	500	71.4% x 980 = 700
8	400	57.1% x 980 = 560
6	300	42.8% x 980 = 419

THE OTHER EVENTS

"Laps" was flown second, and it was scored in basically the same way. Each pilot made one flight and had 4 minutes (from line release) to complete as many laps as possible. An average number of laps was determined and assigned a point value; scoring was done in the same "man-on-man" way as in the Speed Contest.

The order of events is very important, because whatever ballast a pilot decides to put in for the Speed Task must remain in the model for the entire contest! If he add lots of ballast to blister the Speed Task, then he must fly the rest of the event heavily loaded.

The final task is a man-on-man "10-Minute Duration." Here's where having a heavy ship can hurt, because thermals can be difficult to find late in the day. Heavily ballasted ships might also have trouble making a high-scoring landing on the graduated landing tape.



The Jederman Pylon course layout is 30 meters longer than the course that's now used for electrics in the U.S.

IT WORKS!

This adjusted scoring method and the ballast rule keep things close. Pilots can fly any aircraft (at any weight) that they think will give them an advantage, and still be in the hunt if they fly at, or slightly above, the average. They must think and fly to the best of their ability, and in the end, the one who puts in the most effort and shows the most skill wins.

The glider that won the contest I ran several years ago was the then-new Gemini. It was built "deadstock" and didn't even have spoilers. In the first round, the model scored just above average for the speed run (unballasted), completed the most laps, and flew a full 10 minutes with a reasonably good landing. A few speed demons scored much higher in speed, were close in laps, but failed to make their time in duration. The contestants felt the contest was fair, because each pilot was able to "tune" his model to what he hoped would be the winning combination.

Each contestant was also required to help with timing, flagging, or winch retrieval. This helped the event to run smoothly without forcing a few individuals to do all the work. If your club has shown an interest in F3B or Sportsman Multi-Task, try this format and let me know what you think. I'll pass your comments on in this column, and perhaps we can build a real interest in this type of flying.

JEDERMAN (EVERYONE'S) PYLON RACE

It's unusual that the Germans, who prefer very high-tech events, have proposed to the FAI a new pylon contest that should appeal to average modelers. Under the new format, pilots must fly a 180-meter pylon course for 4 minutes. To complete the race, they'll have to use motors with a low amperage draw, and this will result in slower speeds that can be handled by more participants.

These are the basic rules:

● ***Model***—The maximum surface loading is 24 ounces per square foot.

● ***Propulsion***—Electric power must be provided by a battery with no more than seven Ni-Cd cells. The battery's weight mustn't exceed 14 ounces, including all wires and connectors.

● ***Course Layout***—Pylon 1 is 180 meters from the start; pylons 2 and 3 are 40 meters apart and in line with the start/finish line.

● ***Officials***—The *Race Director* announces the start, "3-2-1-0." At 0, a signal sounds, and the timekeepers start their watches. Exactly 4 minutes later, the race director announces the end of the race with the same signal. Each pilot is assigned one *timekeeper* and one *lap counter* (one person can perform both tasks). They count the number of laps flown and use a stopwatch to time each run. (The lap count should be clearly visible to everybody, including the spectators.) For each pilot, there's also a *flagman* at pylon 1.

● ***Start/Finish***—The start takes place into the wind over the start/finish line, and models must be airborne within 10 seconds of the signal. The last lap ends when the start/finish line is first crossed (in the same direction as the start) after the 4-minute signal.

● ***The Race***—In each heat, a maximum of three and a minimum of two models start simultaneously. Each heat lasts exactly 4 minutes, plus, for each pilot, any additional time it takes him to finish the lap he's in when the 4-minute signal is sounded. All pylons must be "rounded" counterclockwise, and all turns are to the left. Laps are counted from the starting signal to the end of the lap that was entered at the 4-minute signal.

For example, 17 laps have been flown in 4 minutes, 7 seconds. The timekeeping starts at the race director's signal and ends with the crossing of the start/finish line (in the same direction as the start). Four minutes is deducted from each pilot's total time, and the overtime recorded. If a pilot fails to round a pylon, the entire lap won't count. If the model touches the ground within the 4-minute period, the pilot receives zero points for that heat. If a pilot fails to complete the final lap after the signal, he receives a penalty. From the second heat onward, the starting groups are formed by the results of the preceding heat(s), so that each heat shows competitive flying.

● ***Contest***—At least two heats are flown, and the number of laps and the overtime are recorded for each; if there are three or more, the worst result is discarded. Of the resulting heats, the total number of laps and the total overtime will count for qualification. The flier with the greatest number of laps is the winner. If two pilots complete an equal number of laps, the one with the shortest overtime wins.

NEW EQUIPMENT

I find this event very exciting and challenging. It will require a new type of pylon racer—one that can fly fast on much less power than is usually associated with racing—and prop/motor combinations will have to be tuned for an amperage draw that allows the models to stay airborne for at least 4½ minutes. The maximum battery weight requires the use of 1200 to 1300mAh batteries.

A sport model with a can motor (at full throttle) is good for approximately 5 minutes. To be competitive, you might have to completely "de-tune" a cobalt motor (timing and prop), or switch to a ferrite motor with more power. A normal electric pylon racer would require more power to fly well, so a larger model might be in order, e.g., a 7-cell F3E model, or a sport aerobatic type.

I'd like to know what you think about these two events. Till next time...good thermals and a full charge! ■

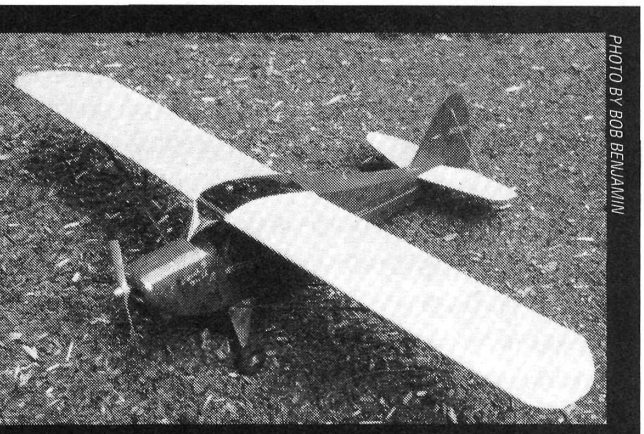


PHOTO BY BOB BENJAMIN

Electric makes Scale Masters!

Bob Benjamin qualified for the Scale Masters with an Astro Cobalt 25-powered 1/6-scale Porterfield LP-65 Collegiate, and that's good news for us electric-flight aficionados! Bob's model is an extensively rebuilt Astro Flight kit, and it's a real beauty, as you can see.

Bob shared some details of the model with *MAN*. To cover it, he used the full-scale Stits process—a polyester fabric covering that's sealed and finished with unique products. Bob says these are probably some of the best-kept secrets around!

How does the plane fly? "Performance is 'better than scale'; that is, I have to throttle way back to achieve good scale flight speed. [T]he Porterfield has never shown any hesitation to take off from any surface...including really ragged, wet grass."

Bob has already picked up some honors with this ship. He placed 3rd at the first annual "Island Classic" qualifier on Whidbey Island north of Seattle, finishing just behind Dick Hansen's Nieuport 28 and Earl Aune's F4U-5N. The Porterfield tied for top static score with two other planes (at 96.25), and it averaged a flight score of about 86. "She'll do better as I settle down!" Bob predicts. We wish him the best at the Scale Masters!

SPECIFICATIONS

Span: 69.5 inches
Weight: 6 pounds, 14 ounces
Wing Loading: 23.5 ounces per square foot
Power: a standard Astro Cobalt 25 geared motor, running on 14 Sanyo SCR 1200mAh cells
Prop: an "extensively reworked" Zinger 13x6-10
Speed Controller: Jomar SM-4
Radio: Airtronics Championship FM 7, upgraded with a 1991 dual-conversion receiver

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OPTIMIZED ELECTRIC

(Continued from page 78)

intermediate glow trainers at my flying field (it already had the slower ones beaten!). Would the plane live up to its name? The story continues in the next issue, so stay tuned to find out!

**Here are the addresses of the companies mentioned in this article:*

Future Flight, *1256 Prescott Ave., Sunnyvale, CA 94089.*

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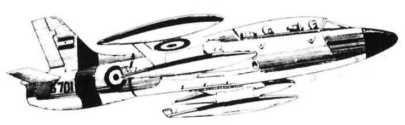
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GOLDEN AGE

OF RADIO CONTROL

by HAL deBOLT

Claude McCullough and his '50s "Triplex"

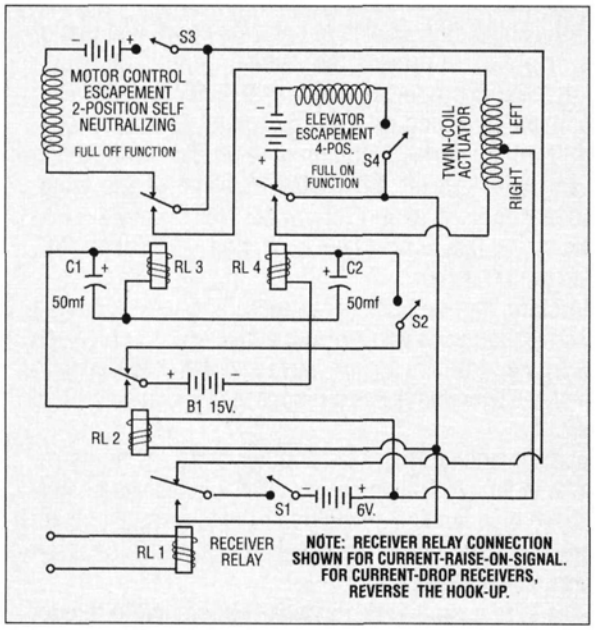


PHOTOS BY HAL deBOLT

Claude's aptly named Baby Buggy used a Forester .29 for power and his Triplex pulse system. Note use of wing slots for stall control.

IF YOU'RE AN OT R/C enthusiast, you'll surely recognize Claude McCullough's name. Claude was a hog farmer by day and an avid scale modeler whenever the hogs would allow. (At meets, he always exhorted us to "Eat pork"!) When a back problem ruled out farming, his hobby led him to a job at Sig Manufacturing, where, for many years, he designed R/C models. How many of you learned to fly with Claude's Sig Cadet? If you can call R/Cers from the '50s *pioneers,* Claude was one of the best.

When he retired, he thought he'd have time for all the projects he had been thinking about, but his output is less than he had expected. He thinks his penchant for scale projects might be the problem, as they just *eat* time! He's getting some things done—mostly off-beat giant scales.



Schematic of the Triplex decoding circuit. (Note complexity required to obtain multi-controls from a single channel.) Also note that two more batteries were required just to serve the decoder. (See text.)

PRE-PROPO PERFORMANCE

Remember that Claude's efforts came before propo and even before reeds. Back then, we knew we needed multi controls, but we wondered how to get them with a single channel. Bonner had his cascaded escapements, which were reliable but, for all practical purposes, limited to a second control. The *pulse* concept seemed to offer possibilities for more, and Claude was among those who explored the idea—but his approach was different!

To come up with a multi system, he first had to choose a reliable radio—one that would require the least attention—because he had to devote his time to the control system. Claude turned to the MacNabb 465 UHF radio and says that increasing the "A" battery supply from 6 to 7½ volts solved his initial problems.

He made another change: his UHF transmitter had a directional dipole antenna that *had* to be pointed at the receiver at all times. While flying his plane, Claude had a lot to think about, and he apparently had difficulty remembering to point the antenna at the receiver. His solution?—a cord for the control push-button with a "helper" to keep the Tx correctly oriented (quite an invention!).

I seem to remember Claude's first multi system having two radios (a 465 and another on 27mHz): one for rudder and engine

(Continued on page 88)

GOLDEN AGE

and the other for elevator. This could work, but it *doubled* the weight of your equipment, which weighed too much already!

TRIPLEX TRIUMPH

Claude says that success came with his version of a multi-pulse system, which he called the "Triplex." It was actually a *delay* system that used the charging-time capacitors to differentiate between the various control actions, and it's a good example of how we tried to operate multi-controls with a single channel. His description of its operation (in a November '56 "Popular Electronics" article) tells it best:

The transmitter keying circuit was connected to a pulse generator in the control box. Control-stick movement varied the pulse length from no signal at one extreme to a steady signal at the other. The stick was used for rudder control and had limited movement so that it didn't reach either extreme of the pulse spectrum. Only rudder was actuated by the stick, and two push-button switches operated additional controls. One switch was the usually closed type that cut off the signal when it was depressed; the other was of the usually open style that produced a constant signal when depressed.

The rudder actuator was of the twin-coil magnetic type. Referring to the diagram, note that when relay RL1 received the up-to-140-pulses-per-minute signal, it caused the magnetic actuator to displace the rudder according to the pulse rate. At the same time, RL2 was keyed, and this, in turn, keyed RL3 and RL4. Relays RL3 and RL4 were delayed for approximately 1/2 second by the 50-microfarad (mf) capacitors, C1 and C2. A pulse rate in excess of 150 per minute caused RL3 and RL4 to stay closed.

The Triplex system didn't offer motor speed control, but it did allow for motor shut-off at command, and automatically if the radio failed. OTers will appreciate the value of this! How many of us have helplessly watched a model disappearing over the horizon with its engine droning merrily and its radio dead?!

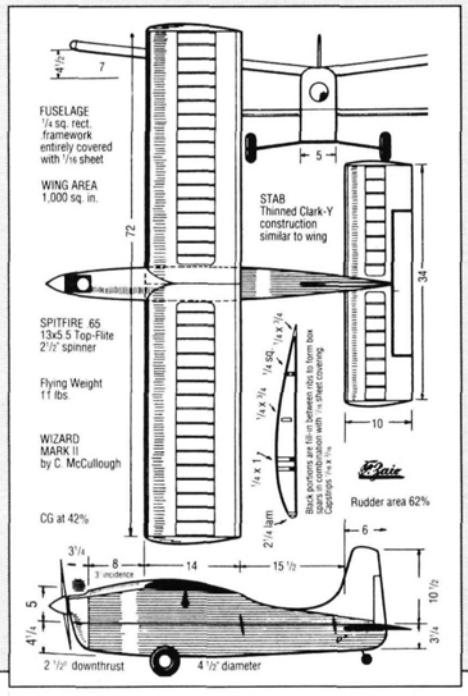
The engine cutoff feature worked like this: if a full-off signal of about 3/4 second was sent by way of S5 (see diagram), RL3 opened after 1/2 second and keyed the engine escapement. To shut down the engine, the escapement operated an air-bleed-style valve in the fuel line. Since this operation had no pulsing, the slip-stream blew the rudder back to neutral and allowed a safe flight.

Similar action occurred with RL4 when a full-on signal was sent by way of S6 to operate the elevator escape-

WHEELS AND MORE WHEELS!

Claude McCullough's R/C designs are always practical, and they show his aptitude for meeting fliers' needs—without frills! A look at one of Claude's early designs will show his use of aerodynamics.

Thanks to Frank Zaic, I can show a nice three-view of one of Claude's typical designs, which always looked "stumpy," even though he used a respectable tail-moment arm. Why? His pigs were his inspiration! (Naw, not really!) He was more practical than that; his equipment was *big* and he wanted ample room for installation. This design was powered by a Spitfire .65, so Claude provided an ample wing area to carry its hefty 11 pounds at the desired low speed. Both the wing and the substantial stab used high-lift Clark-Y airfoils. With the wing set at 3 degrees and the stab at 0, there was appropriate decalage (the difference in degrees between the angle of incidence of the wing chord and that of the horizontal tail) to provide the needed "automatic recovery." With the stab producing positive lift, however, the mean C/L was behind the wing C/L, and this resulted in a CG location of 43 percent. Surface settings were prudent for the glide speed, and with the lift differential in favor of the wing, downthrust was used to control power. These were the features of a model that almost flew itself, and which, with R/C, you could guide easily.



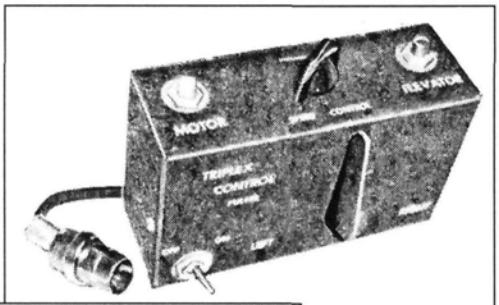
Three-view of Claude McCullough's Wizard—one of his many early R/C designs.

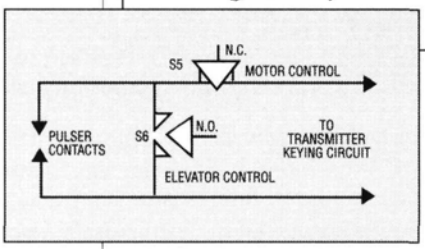
Its structure was surprisingly modern and very robust: a sheeted D-section wing and tail with added spars; a fuselage that was framed from 1/4 square balsa and then covered with 1/16-inch sheet. Everything was strong, because Claude wanted to be *safe!*

The plane's landing gear was another story. (Note its resemblance to an LW Trainer's.) Early R/C planes were hand-launched, so their landing gear didn't have to withstand takeoffs. The gear were mostly designed for the planes to sit on and for protection when landing.

Changes in rules and in the tastes of R/Cers led to the development of gear suitable for takeoffs—a major step forward. Low-powered, heavy models are difficult to get off the ground, even with properly designed gear. Although a modern tail-dragger probably has good takeoff characteristics, you could

ment. Claude produced his own *heavy-duty* four-position escapement for the elevator. It allowed *half* elevator movement whenever it was required (with judicious pulsing of S6, of course!). After moving the elevator to the position required, rudder control was re-activated.



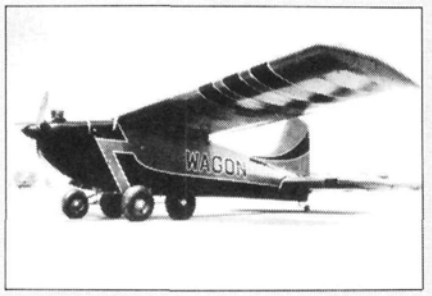


The McCullough Triplex transmitter control box. Stick on front was for pulsed rudder control. Top push-buttons operated engine and elevator escapements. Connected to Tx with cord.

The various methods of coding the single available signal produced three control functions, and the mixing of the received coded signal in the delay circuits deciphered the coding to create the desired action. This really got a lot from one signal and was obviously complicated, but Claude says it met his need for multi controls when there was no other way to have them. Today, just *one* little integrated-circuit chip will provide so much more! That's progress! ■

experience the difficulties Claude faced by attempting a takeoff at about quarter throttle. Try it, and let me know if it was fun!

As Claude's early designs show, his solution was to use *four* wheels. (If a third helped, four would surely be better?!) Claude assures us it was a viable solution, but he took much ribbing about it: nicknames like Baby Buggy, Box Car and Go Cart were common. Of course, with a fourth wheel, the gear's appearance was just as bad as the increased drag the extra wheel caused!



McCullough multi-wheel Wagon solved his takeoff problems. Note this early bird's semi-symmetrical airfoil.

Claude says I solved his "wheelie" problem! I had discovered the solution during my experiences with C/L stunt flying, in which nothing is more important than takeoff and landing points. By trial and error, I found the ideal gear location. After that, it was relatively easy to find the best wheel location. Using the CG as the reference point, I found that if you located the point where the wheel contacts the ground anywhere on a line intersecting the CG at a 17-degree angle forward from vertical, good tracking would be a sure thing. Even with ideal gear location, however, taking off with heavy, underpowered craft still required considerable dexterity!

Claude McCullough used his knowledge of aerodynamics to produce innumerable R/C designs, and that's probably why he has given us so many successful *true scale* R/Cs; they're all based on his early experiences!

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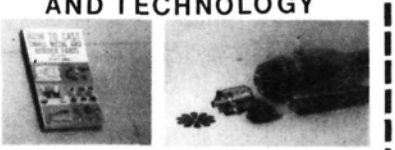
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PROFESSOR 40

(Continued from page 81)

the two aileron pushrods. (On radios with dual-rate adjustment capabilities, this can be done electronically at the transmitter.)

All tuned up again, we launched the Prof on its second flight, and it seemed great for any beginner. Its takeoff track down the runway was straight, and the ailerons were "soft" but effective enough to manage a slow, trouble-free roll. I turned the transmitter over to George who, after some initial nervousness, maneuvered the Prof around like a pro. Even in a slight wind, the Professor flew smoothly, and George went through six tanks of fuel before a combination of too much wind, too little altitude and a lack of instructor attention caused our trainer to hit the ground—squarely!

In spite of the rather severe impact, there was remarkably little damage. The "reconfiguration" was limited to the nose area, from which we had to remove the plastic windshield to make repairs. I backed the wooden structure with lite-ply "scabs," which I "Zapped"* into place after I had checked the alignment of the engine mount and firewall.

Although it was wrinkled, I epoxied the foam sheet material back into position as well as I could, without reducing the structure's strength. It's amazing how, when the "prettiness" of a new airplane has worn off (by use or accident!), the learning rate accelerates (a "What-do-I-have-to-lose?" approach!). As long as the airframe is safe and structurally sound, looks can wait until later.

George put many more flights on the Professor before it was time for him to leave for his home in El Paso, TX. His progress was so encouraging that I gave

(Continued on page 111)

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HELICOPTER SECTION

92 First Annual Kyosho Helicopter Challenge by Datu Ramel

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The First Annual Kyosho R/C Helicopter Challenge was a contest extravaganza featuring the latest machines and fantastic flying. Our regular feature writer Datu Ramel brings us details of this world-class action and complete results!

This page shows Nina Officer (who placed 6th in the Kyosho Novice Class), with husband Kent calling, as she practices hovering maneuvers.

THE FIRST ANNUAL

KYOSHO R/C Helicopter Challenge

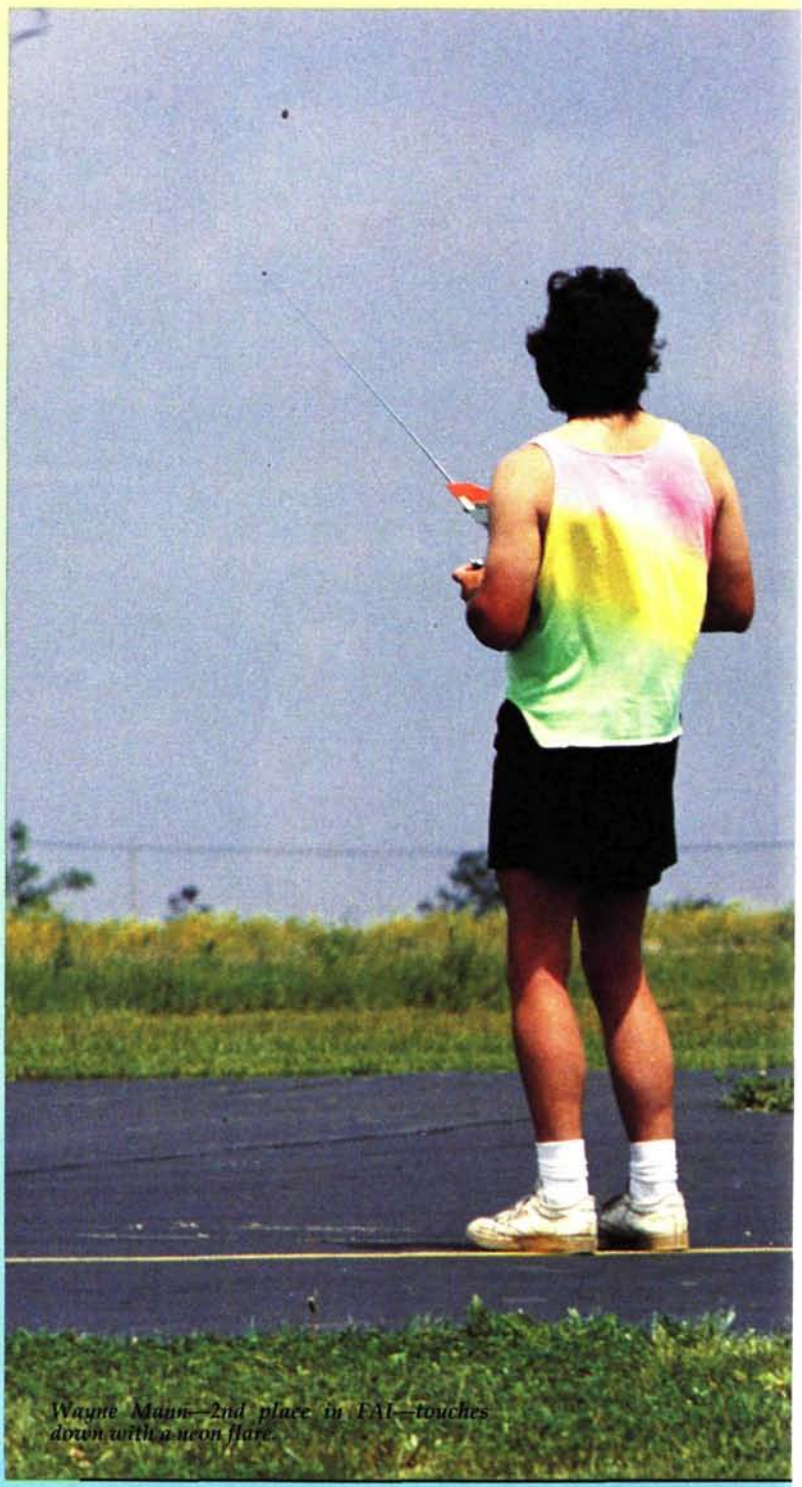
by DATU RAMEL

HAVE YOU heard of Champaign? When I was growing up in Chicago, it was where the "Elite Eight" high school basketball teams played. In "2001: A Space Odyssey," it was mentioned as the birthplace of HAL 9000, the talking computer. Speed Skater Bonnie Blair brought Olympic medals back to her home here, and for some people, it's a New Year's Eve drink. In recent years, this central Illinois college town has become the commercial and distribution center of the hobby industry, and now it's the home of a major model helicopter event.

Along the flight line, the First Annual Kyosho R/C Helicopter Challenge (which was for .30-size models) was given a nickname. Those who knew that the new Kalt machine's name is the "Space Baron" (it has a *planetary* gear drive!) said the event was "the weekend the Enforcer and the X-Cell strike back" (more of this later!), and more than 400 locals came to watch. They enjoyed a superbly organized contest that set the stage for crowning this year's National Champion.

Officials and contest workers included employees of Hobby Dynamics, Horizon, Hobbico, Tower Hobbies and Great Planes, all of which have offices in Champaign. Jamie Clancy, Kevin Hyatt and John Reiter judged for Novice; Kevin Burner, Jerry Hicks and Randy Gibson scored Intermediate and Scale; and Bill Jeric, John Adams and Craig Hath judged FAI.

Kyosho Concepts dominated the three non-FAI classes, and a handful of new Enforc-



Wayne Mann—2nd place in FAI—touches down with a neon flare.

Major new heli event attracts world-class fliers

ers flew against the Kyosho majority in Novice and Intermediate. FAI featured one Shuttle ZX, three X-Cells (which finished 1st, 2nd and 4th) and four Enforcers, and the rest were Concepts.

A look at Jeff Reed's Novice-winning machine shows what kind of preparation goes into a contest helicopter. Its stabilizer system uses a 4mm-diameter flybar through a drilled-out seesaw, Kalt white paddles and two sets of flybar weights. At the

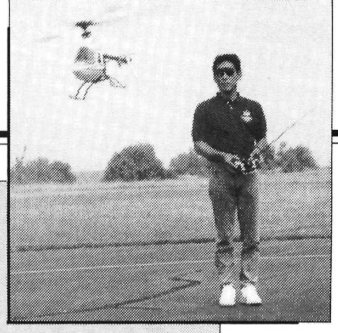


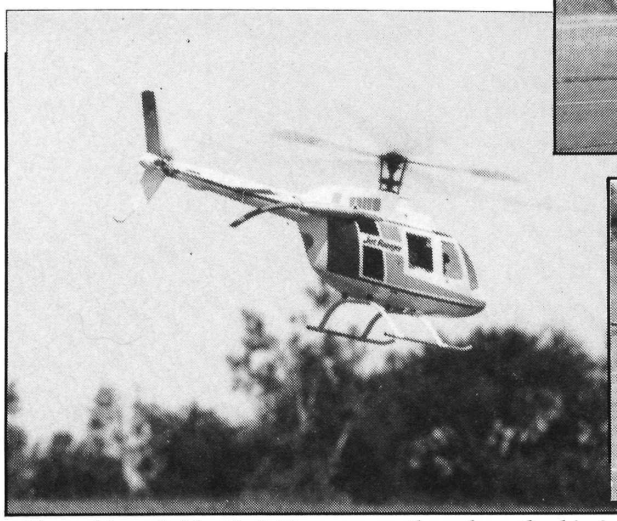




•Above: United States FAI team member Tom Dooley flies the Kalt Enforcer.

•Below: Miniature Aircraft X-Cell, Kalt Enforcer, Hirobo Shuttle ZX and Kyosho Concept SE on the flight line.







•Above: Norm Labhart's JetRanger was the only scale ship in FAI. This was Norm's first contest, and he finished 11th. •Top: Kazuyuki Takayanagi demonstrates the new Concept SX.•Right: Tim Schoonard (4th-place FAI) and Cliff Hiatt (1st place FAI) strike a contest pose.

tail, Kalt double-bearing metal blade grips replace the stock plastic Kyosho components, and one length of .078-inch piano wire replaces the standard rod/snap-link/ball/wire.

Intermediate's top finisher was Stan "'Copter Boy" Olzaski—a certified helicopter enthusiast from Long Island, NY. During the practice flights, I couldn't decide whether his ability (he could probably fly rolling circles around me!) or his '90s rock music was making me feel old. (I grew up to the sound of the Beatles.)

With a beautiful Bell 222 that ran away in the Static scoring, heli columnist and movie miniatures pilot Larry Jolly looked as if Scale was in his pocket, but, owing to a variety of mechanical problems, he never registered an official flight. Don Chapman won the class with a very clean Hughes 300. "D.C." is no stranger to Scale competition; in the past, he has wowed the judges with his very quiet Hughes 500Cs.

The FAI entrants included two former National Champions (Hiatt and Mas) and five veterans of World Championship competition: Hiatt (7th in '85), Mas (9th in '87), Nagatsuka (Japan, 4th in '85), Saragosa (Italy, 19th in '85 and 21st in '87) and Schoonard (9th in '89).

FAI winner Cliff Hiatt may now be savoring some sweet revenge, since he beat Yoshiaki Nagatsuka, who had finished three places ahead of him at the 1985 Worlds in Canada. I must mention Wayne Mann, who took 2nd; he out-scored three pilots who have placed in the top 10 in world championships. Hiatt and Mann finished in 1st and 2nd again at the AMA Nats just 5½ weeks later. At the time, no one thought of the Champaign contest as a tune-up for the Nats—except perhaps for Cliff and Wayne. The Kyosho Challenge sure knows how to pick a couple of winners!

THIRTY-SOMETHING

During the weekend, little mention was made of ".30 versus .60" or "small

FINAL STANDINGS

B=Baron; C=Concept; E=Enforcer; S=Shuttle; X=X-Cell

NOVICE

1. Jeff Reed	C	536.5
2. Mark Burks	C	523.0
3. Jim Robertson	C	513.5
4. Laura Melnik	E	508.0
5. Tony Chisum	C	503.0
6. Patrick Connell	C	497.5
7. Nina Officer	C	494.5
8. Gary Breithaupt	S	492.0
8. Bob Dunkirk	E	492.0
10. Lonnie Prince	C	486.5

INTERMEDIATE

1. Stan Olzaski	C	340.0
2. Michael Bantz	C	327.0
3. Steve Gray	E	298.0
4. Michael Ellis	E	259.0
5. Orval Abney	C	238.0
6. Jim Skelly	C	215.5
7. George Ford	C	175.5
8. Gary TuckeR	C	142.5
9. Ron Pound	C	112.0
10. Don Costa	E	107.5

SCALE

1. Don Chapman	Hughes 300 Concept (yellow)	1998
2. Spencer Forman	Hughes 500 Concept (military)	1352
3. Mark Johnson	JetRanger Concept (white, red trim)	1247
4. Larry Jolly	Bell 222 Concept (flybarless, retracts)	—

FAI Final Results

1. Cliff Hiatt	X	675.0
2. Wayne Mann	X	667.5
3. Yoshiaki Nagatsuka	E	654.0
4. Tim Schoonard	X	653.5
5. Mike Mas	S	652.0
6. Dan Melnik	E	578.0
7. Dwight Shilling	C	569.5
8. David Finkelstein	C	523.0
9. Frank Dykes	C	514.5
10. Don Chapman	C	496.5

helis" or "machines for beginners." Hours passed, and there was so much *helicopter* stuff going on—competition patterns flown, friendships made, help sought and provided, technical advances shared, hot-dog maneuvers marveled at—that no one had time to reflect on how large or small the machines were. Anyone who owns or flies a .30 ship had a stake in the Champaign event and is part of the group who made the Kyosho Challenge possible. On this weekend, size didn't matter.

The FAI and demo machines entered and exited their aerobatic maneuvers consistently lower (at altitudes of 10 to 15 feet) than their .60-size counterparts. Al Schneider, who's an accomplished freestyle and FAI pilot, said that the FAI rolls at this contest were the best he had ever seen at any R/C heli contest, including the World Championships. Talking to some fixed-wing pilots, I pointed out that the reliability of the equipment at this event was better than at most of the .60-size contests I had attended.

Just how did this display of first-class aerobatics, this national event for 53 pilots with .30-size helicopters, take shape? It's a simple idea, but it didn't come about overnight.



Part of the flight line in Champaign.

CHALLENGING CONCEPT

In July '88, I stared at the results of a practice crash and decided I would have more fun at the upcoming Tidewater Nats with my patchwork Shuttle than with my mincemeat Champion. There was nothing in the rules to keep a less-than-.60 ship out of FAI and, besides, I was confident that a small heli would be able to do the hovering maneuvers. The fact that no one else had ever flown a .30 ship in a major FAI event didn't bother me!

In the exciting second round, the

DARING DEMONSTRATION FLIGHTS!



Mike "the Spike" Mas (5th place FAI) executes the first, inverted, one-point landing with his shuttle ZX.

"MIKE THE SPIKE"

Mike Mas was given a new nickname when he performed, for the first time in public, an inverted one-point landing. Before I describe this maneuver, imagine trying to make a controlled helicopter touchdown when all you have for landing gear is a downward extension of the main shaft. Gremlins from the physics texts—gyroscopic precession, phase shifting, ground resonance and divergent oscillations—would surely make you or your machine a basket case. No problem for Mike! Once, flying with him in Florida, I saw him keep one landing skid planted on top of a fence pole while his machine did pirouettes. This weekend, Mike kept the gremlins in check, and his Shuttle ZX did the pointed deed upside-down with a rod attached to the rotor head providing the only support. On touchdown, the main rotor system became fixed, and Mike hovered by steering the fuselage. Just call him "the Spike"!

...AND OTHER HIGHLIGHTS

Dave Finkelstein's Concept did some beautiful rolls—not quite at eye level, but still well below the rim. His screaming engine gave Don Chapman an audio tach reading of 22,000 revs! Dave pulled down a Youngblood-style inverted autorotation with a half-roll recovery at 50 feet to a normal flare and touchdown.

Dan Melnik used his Enforcer to uncork a variation on his Fickle Five-Forty. A few months ago, I diagrammed Dan's Stall Turn That Can't Make Up its Mind with a Half Pirouette One Way Then a Full Pirouette the Other Way at the Top! In Champaign, Dan added 360 more degrees—two spins after the reversal—so we must now call it the "Fickle Nine Hundred"! Dan finished his demo with one of his signature maneuvers: an engine-off quintuple spiral autorotation from "nosebleed-land."

Yoshiaki Nagatsuka gave some Ni-Cds a real workout when he put a prototype Kalt Whisper electric helicopter through its paces. Linked stall turns, a loop, a roll, an autorotation—this machine could have flown in Intermediate! The aptly named Whisper is nearly the size of an MH-10, and it can fly 6 to 8 minutes on a charge. It's stable enough to hover hands-off in a 12-knot breeze.

IMPRESSIVE RECOVERY

When Kazuyuki Takayanagi and his Concept SX took the field, we saw a flight demonstration much like Shigetada Taya's after last summer's Worlds: triple loops, end-for-end tumbles in forward flight, consecutive square loops, exterior circling pirouettes, a double rolling stall turn (a half-roll during the dive as well as one during the ascent), and lateral-8s (alternating exterior nose-in and tail-in circles). Kazuyuki placed 7th in the last Japanese National Championships, and he works for Raya on the helicopter design team that has contributed to both Kyosho and Kalt.

On Friday, during Takayanagi's low-level, switchless, inverted practice, his engine started to sputter, and it looked as if he would surely have to land on his blades. I glanced over to see him calmly jerking and gyrating the elevator stick to shake free what must have been a stuck fuel clunk, because, just as the SX was about to strike asphalt, the engine "came to" and the machine did a nice half-outside loop back to an upright attitude. I was *impressed!*

CONTEST ANECDOTES

Hang On To Your hat: Sunday afternoon's 20-knot gusts caused CD Tim Lampe and Head Judge Tom Dooley to change the direction of the flight. According to Glenn Skanderup, this is why European fixed-wing pattern pilots always have a slight advantage over American fliers. He explains that the smaller fields and limited airspace in Europe don't allow fliers the luxury of changing their flight line to align with the wind, so they practice no matter which way the wind is blowing.

Another nail in the coffin: the wicked switch is dead: this refers to the weekend's only "safety" incident. On Saturday, one of the helis chased and caught its pilot, who was treated for a cut, a bruise and a possible broken bone in his foot where he was struck by a main blade. The wayward heli also gave the transmitter an "antennectomy"! Witnesses speculate that the pilot inadvertently hit the invert switch and caused the mishap. If this is so, it's more evidence that the invert switch has had its day. All the demo pilots in Champaign flew real, switchless inverted. Kindly inhibit or disable your invert switch today!

Best Performance by a Stenographer: this was awarded to Dwight Shilling, who flared down short of the spot because he ran out of fingers trying to throw four switches in the proper sequence to kill his engine and get to his hold curve.

Let's Be Philosophical About the Pattern: "Minnesota Slick" Mark Johnson commented that "Aerobatics is nothing more than different ways to enter an auto. My maneuvers all end up looking like autos anyway."

Best Performance by a Couple With a Movie Title Nickname: a fine result in Novice by "an Officer and a gentleman"—Nina Officer and Kent, her husband and caller. Kent, who's a pilot, has long been into full-scale aviation, but he's now giving priority to model helicopters. Kent encouraged Nina on the Concept just six months ago, and she overcame the wind and insect bites to finish 6th.

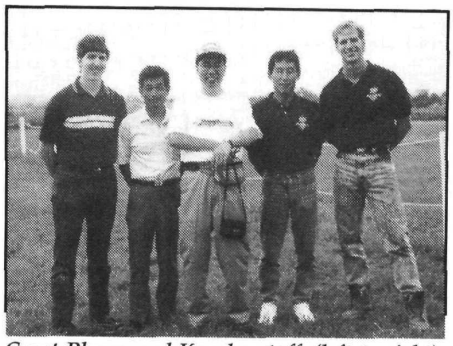
KYOSHO CHALLENGE



Larry Jolly hovers his scale Bell 222. Despite his top static scores, engine problems kept him from placing well in the flying and combined points.

canopy kissed the machine goodbye during the 540 Stall Turn, and I wrote a new chapter on ground-evasion tactics with my tail-heavy Shuttle! Even as the inevitable hard landing approached, I remember thinking, "I'd be a lot more embarrassed if I weren't the only small helicopter pilot here. If everyone else was flying a Shuttle..." My thinking was interrupted by the flare before the attempted touchdown—no canopy means that a flare is *somewhat* automatic!—and I filed away my first notion of a .30-size contest as an afterthought.

In the fall, I started consulting for Great Planes to help them test and market the Concept 30, which started its retail sales climb early in '89. The company asked me for ideas on promoting the small Kyosho helicopter. I suggested either a one-make, hot-dog contest (sort of an IROC for model helicopters with big-name pilots invited to fly identical Concepts), or a traditional open contest using the four AMA classes (Novice, Intermediate, FAI and Scale) limited to .30-size machines. Great Planes wasn't sure it had the expertise or manpower to stage such an event, so my ideas were shelved for a while.



Great Planes and Kyosho staff: (left to right) Giger, Mihard, Niwa, Takayanagi and Lampe.

In early '89, I suggested that Hobbico and Kyosho sponsor a major heli contest in the late winter or early spring of each year to fill the gap in the helicopter schedule between the Tangerine and the spring contests. I even came up with some names for the meets—ones that could be associated with various dates. The late winter date was, I admit, a gimmick; I was willing to bet that my fellow pilots were crazy enough to support a gloves-and-boots fly-in on the snowy prairie. (I had just learned I would be working on an instructional videotape in upstate New York in January.)

"Three great ideas so far," said Great Planes, "...but can you organize it?"

My wife was expecting our first child, and my business was growing, so I politely declined the opportunity to lead the project. Great Planes needed someone like Mark Wilson or Cliff Hiatt to wear the contest director hat.

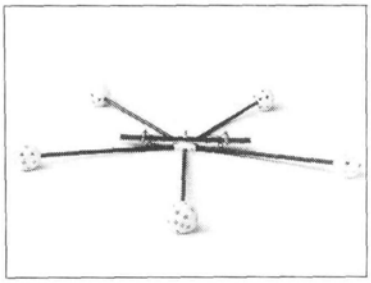
TIM IN TIME!

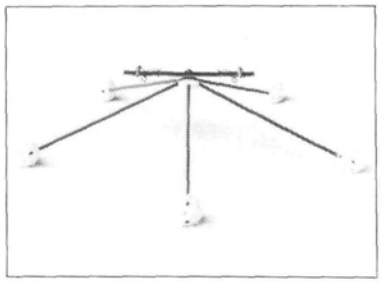
It wasn't until the March '89 RCHTA show that an important piece fell into place. In Pomona, I got to know Tim Lampe, a Great Planes employee who demonstrates R/C models at shows. We did some test hovering together, and I saw that Tim had a lot of enthusiasm for helicopters. That summer, I saw Tim at some fun-flys, and his

(Continued on page 116)

ROTARY-WING ROUNDUP

DOBYNS ENTERPRISES
Rotopod



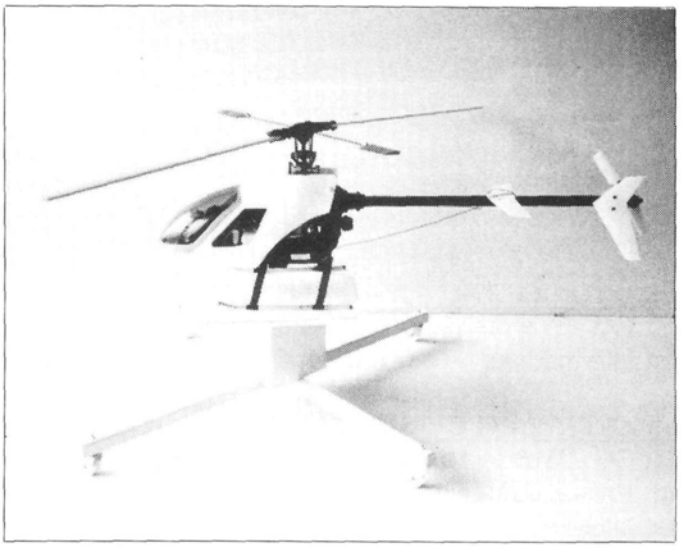


Rotopod is a pilot-training device for R/C helicopter fliers. Its unique features make learning easier, quicker and safer. The elevated pentapod construction provides cushioning for those "hard landings," while lifting the helicopter above troublesome ground effect for more stable take-offs and landings. To remove the guesswork and to speed-up the learning process, Rotopod's adjustable cyclic device allows on-the-ground training and visual feedback. It's light for liftoff and forward flight, and its dual-flight configuration capability allows the operator to change from the elevated Rotopod configuration (for new pilots) to a flat, conventional, landing gear for intermediate fliers. It features mounting clips for easy, secure attachment and removal, and it's available in two sizes: 0.32 for helicopters weighing up to 6 pounds, and 0.60 for those weighing up to 10 pounds.

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For more information, contact Dobyns Enterprises, 1716 Calavera Place, Fullerton, CA 92633.

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For more information, contact Product Dynamics Enterprise, P.O. Box 35427, Dept. 225, Canton, OH 44735.

GMP
Mini Elite Rotor Head



The Mini Elite Rotor Head V30EH comes fully assembled and can be used with most 30-powered collective-pitch helis with an 8mm shaft. It has four radial and two thrust bearings and is standard on the Viper. It's available as a retrofit to upgrade the performance of the Shuttle and Concept 30. The Mini Elite is the miniature version of the contest-winning Elite head.

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For more information, contact GMP, 23961 Craftsman Rd., Calabasas, CA 91302.



GMP Viper

GMP's Viper is the only 30-powered (28 to 34 engines) metal helicopter in the world today, and it's made in the USA. It's available as a kit or assembled; in a pod-and-boom version with a semi-scale super body; or with various scale fuselages. Collective pitch and autorotation are standard. The main rotor diameter is 44 inches, the tail rotor diameter is 8 inches, and the heli weighs 5.5 to 6 pounds, ready to fly (with gyro).

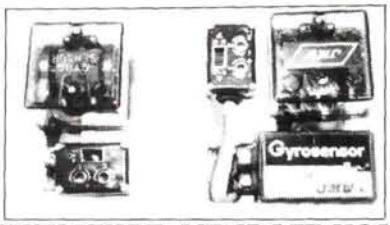
Price: Viper 30PB Pod-and-Boom kit with assembled Mini Elite head—approximately $425. Viper 30MB Pod-and-Boom kit with assembled Mini Mus tang head—approximately $400.
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HELICOPTER CHALLENGE

CIRCUITOUS CHALLENGE—HALF THE FUN IS GETTING THERE!!

by CRAIG HATH

IF YOU'VE READ and followed the steps outlined in the flight training program in the September issue, you should be ready to attempt your first circuit in forward flight. "Circuit" refers to the actions you must do for a successful forward flight. "Forward flight" refers to the helicopter's transition out of hover and into a constant forward motion. The key to increased flying freedom is being able to enter and exit forward flight. For the new helicopter pilot, accomplishing this step is the equivalent of a fixed-wing pilot's first solo flight.

FLYING!

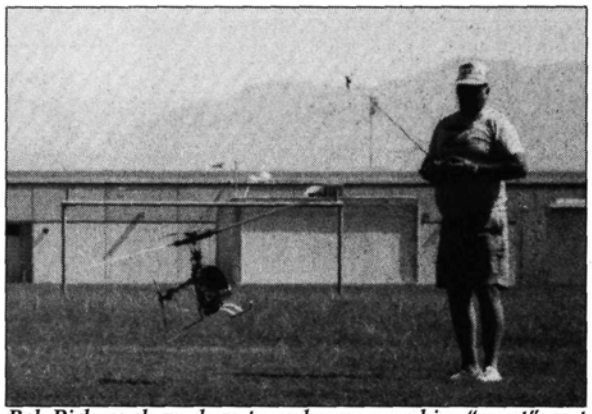
We've arrived at the field! Weather is an important consideration. Pick a day with a slight wind that's blowing in a direction that allows you to get your machine airborne and land it without pointing it at any obstacles. At the beginning and end of your flight, your flight direction keeps the helicopter heading straight into the wind. A light wind helps to keep its nose pointed into the breeze during the transition back to hover. For your first flight, you might consider a day with fairly strong wind (15mph or so) as long as it's steady. Gusty conditions are dangerous, so avoid them. Unpack your gear, and prepare to fly!

THE STEPS TO FLIGHT...

Put your machine into a hover and limber up your flying fingers! Maneuver around, practicing your slow forward circles from the last lesson, until you've warmed up both mentally and physically. When the helicopter circles to the point where its nose heads into the wind and it's moving away from you, gradually open the throttle/collective, in small increments, until the machine climbs (vertically and horizontally) slowly. Other than a slight correction of the tail rotor to compensate for the increased engine torque, you won't need to change any other control for the initial climb.



Timothy Garth's UH-lb exemplifies the beauty of a helicopter in forward flight.



Bob Pickens shows how to make your machine "coast" past you when exiting forward flight. This helps you to avoid becoming disoriented when re-entering a hover.

When the helicopter is climbing at a comfortable rate, stop increasing the throttle. Don't automatically open the throttle wide in a nervous attempt to keep your machine in the air! A helicopter is more efficient in forward flight than in hover, and it requires a lower throttle setting to maintain lift. Most beginners are instantly in trouble because they use too much power in forward flight. The machine will try to climb, so you must hold some down (or forward) cyclic. The increased forward speed that follows requires that you make more quick decisions and adds to the excitement (which is exactly what you *don't* need right now!). When the helicopter is moving along, pull the throttle back just a hair, and fly around! Relax and reassure yourself



Vince Canzanese's Bolkow 117 shows off its stuff in forward flight. You can learn to get your machine airborne and back in one piece, too!



One sad note: the modeling community will miss Troy Dagnieau who died recently.

that you're doing well!

As the machine moves away, start a turn before you start to lose sight of it. Be sure its first turns are away from you and not over the pit area at your field or toward any obstructions. Start the turn by giving a little roll cyclic in the direction in which you wish to move. Now it's necessary to watch the helicopter and correct for any excessive heading changes. Usually, you'll have to add a little tail-rotor pitch in the same direction as the roll cyclic. This will bring the tail around with the rotor disc and is referred to as a "coordinated turn." At the same time, you may also have to hold a slight amount of back cyclic to prevent the nose drop from the slight decrease in lift caused by tilting the rotor head from level.

A common pilot error here is the tendency to over-roll the cyclic when, in fact, the turn could be made by using more tail rotor. You might roll the helicopter onto its back if you don't correct for an over-roll! Try not to freeze on the controls, and remember that if you get into trouble, do the *opposite* of what got you into trouble. For instance, if the helicopter seems to over roll to the right, give it some left cyclic. If it climbs too much because of back cyclic, give it some forward cyclic to counter it, etc. To maintain altitude, it may be necessary to increase the throttle slightly in the turns. You may also notice that you need to hold a slight amount of forward cyclic to keep the machine from stalling.

Fly around in figure-8s at a constant altitude for a few circuits. Double-check to be sure that you're not letting the machine's forward speed increase, or allowing it to get too high. Remember that we all have a tendency to increase the throttle to wide open, so keep working with the throttle to get a feel for how it affects the flight.

Fly around until you're comfortable. Take your time and enjoy watching your machine move about the sky. At this point, you should be able to guide it through the air, and you should discover that forward flight is easier to control than hovering.



Once again, the author demonstrates re-entry to hover from forward flight. Notice how the pilot looks at the helicopter from an angle? This gives a better view of the helicopter, and it reduces the likelihood of confusion about the direction in which it's moving.

DECENT DESCENTS!

With your confidence soaring, start a few descents. Begin a descent by reducing the throttle as the helicopter comes around with its nose heading into the wind and the rotor disc level. Try to get a feel for how the helicopter descends. If you've kept its speed down, it will settle into a glide slope that's predictable and stable, but if it's moving too fast, it will zoom by as if you hardly did anything. Be sure to reduce the throttle only enough to make the machine descend. A common mistake is to pull the throttle completely down in an attempt to get

(Continued on page 111)

PREPARATION

Until now, you've probably been flying your helicopter with a limited pitch curve to keep you out of trouble in case you "over control" the collective pitch in a panic situation. From now on, you'll need more pitch to help overcome the momentum that the helicopter's increased speed has produced. The total pitch curve will be adjusted at both ends of the spectrum, while your hover point will be the same.

The basic pitch curve varies according to the helicopter and engine combination. Generally, the curve will be between -1 or -2 degrees and +8 degrees. If your radio has an adjustable pitch curve, or end-point adjustments on the collective-pitch channel, use them to make the required adjustments. If your radio system doesn't have these features, move farther out on the servo arm or wheel to increase total servo throw for the collective pitch. Be careful not to overdo the pitch curve—in this case, more is not better. Too much top-end pitch will overload and overheat the engine; too much negative low-end pitch will cause the helicopter to sink rapidly when the throttle stick is pulled back for landing.

When you've established the pitch curve, check the high-speed needle setting. The best and safest way to do this is by strapping the helicopter to a test stand, and running the engine at full speed. This permits access to the high-speed needle valve. If a test stand isn't available, the needle can be set by trial-and-error, full-power takeoffs. To use this method, you'll need an experienced pilot to get the helicopter safely up and down between needle adjustments. Set the high-speed needle slightly on the rich side, and be sure that the engine runs dependably at full power. If the engine seems to be set properly, but still lugs down under the load, reduce top-end pitch. Conversely, if the rotor seems to over-speed at full power, add a little more top-end pitch.

Over the years, I've mentioned the constant rotor-speed setup for collective-pitch model helicopters. This refers to matching the throttle with the collective pitch so that, for most throttle-stick positions, the rotor speed remains constant. A big advantage of this setup is that the rate of descent can be easily controlled when the helicopter transitions out of forward flight and back into hover. At this stage, I wouldn't expect a pilot to have this setup perfected. One simple step that you can take to get a jump on the constant speed rotor, is to advance the idle or throttle trim to a fast idle during flight. Try moving the trim up to a point where the rotor's ground speed is a little slower than its hover speed. Experiment with the trim until you don't detect any rotor over-speeding during landing descents. With these preparations behind you, you should be ready to fly!

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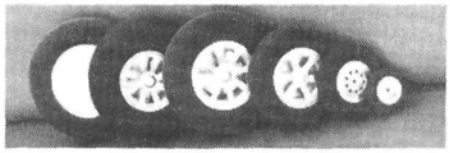
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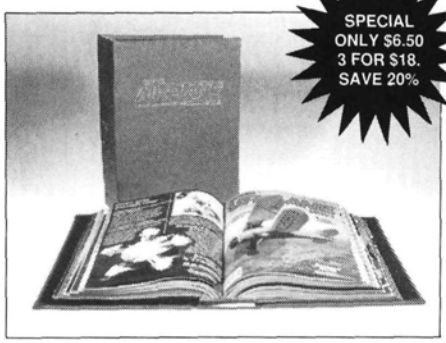


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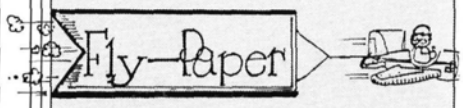
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CLUB OF THE MONTH



R/C BARNSTORMERS

1154 S. Lennox, Olathe, KS 66061

The "Fly Paper," the newsletter of the R/C Barnstormers of Johnson County, KS, is packed with information, thanks to the efforts of its editor Carl Melin. Club President Gordon McWilliams writes an interesting, chatty column. This past summer, he raced in the AMA Natonals at Lawrenceville, IL, and in the Nats. He writes, "I managed to get off the ground for every race, finish all but two rounds (one Formula 1, one Quarter Midget) where I double cut, and now for the big news—I didn't crash any airplanes. I didn't win anything, but I did have a really good time, and I've got airplanes left for more races." He goes on to thank the club instructors for all the time they've taken to help newcomers. It's obvious that he cares about his club.

A few reminders always help to keep the members focused on important issues, i.e., electing club officers: "Be sure to come to the meeting and voice your opinion; if you don't come, you don't have a whole lot of right to complain about something if you don't like it;" swap meets: "Don't forget to take your money, or to buy someone else's goodies. Last year's meet had quite a few deals."

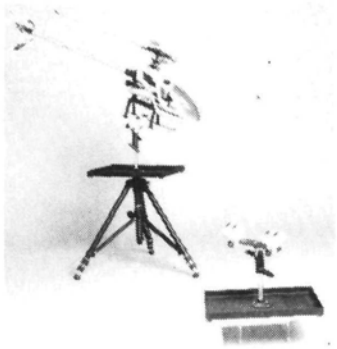
Highlights of the previous month's meetings were discussed. Jeff Nelson gave an overview of the Club's Fun Fly, which drew 13 contestants and had lots of good food. No meeting would be complete without a discussion of safety practices and conditions at the flying field. Concern was voiced about the flight approach and its proximity to a nearby farmhouse.

The club's Vice President, Randy "Doc" Scraper writes that their 400x80-foot runways have provided ample room for beginners and experienced fliers. Except for some occasional excavation work by a few resident gophers, the runways are improving and getting smoother and more level. There's always a lot to do, though. Their field entrance needs improvement, as does the parking. Sound familiar? He writes: "Remember, the more we use the field and the better we take care of it, the more likely we are to keep it for a long, long time."

Congratulations, R/C Barnstormers for being our "Club of the Month." Enjoy your two, free subscriptions.

PRODUCT NEWS

Descriptions of new products appearing in these pages were derived from press releases by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by **Model Airplane News,** or guarantee product performance. When writing to the manufacturer about any product described here, be sure to mention that you read about it in **Model Airplane News.**



LIGHTNING PRODUCTS
RotorCraft Workstation

This work station was specifically designed for building, repairing and displaying R/C helicopters. Made of durable, high-tech materials, its special skid clamps securely hold R/C helicopters larger than .60. It tilts up to 180 degrees and rotates 360 degrees to allow an infinite number of working angles. The heavy-duty pedestal mount and base tray provide a steady platform, regardless of working angle. It can be mounted on a sturdy tripod for use as a portable work stand, and it will also fit the chassis of many 1/4-scale cars.

For more information, contact Lightning Products, P.O. Box 1607, Tomball, TX 77377.



FUN SCALE
Mustang

Plans for a king-size Fun Scale Mustang are now available! This exciting model has a 90-inch wingspan and a 1450-square-inch area, and it weighs between 11 and 14 pounds. Its 17- to 24-ounce wing loading makes this Jim Meister design great for novice fliers, and its very slow takeoff and landing capabilities must be seen to be believed! The Semi kit is for .90- to 3.0-cubic-inch, 2- or 4-cycle engines. Easy-to-follow plans simplify construction and show you how to make a retract tail wheel for 60 cents in 40 minutes, a universal exhaust manifold and a simple hookup to a $2 lawn-mower muffler. Send for free brochure.

Price: plans (4 large sheets) $35; canopy $20; 4 1/2-inch spinner $20; shipping $5.

For more information, contact Fun Scale, 220-65 Camino Corto, Vista, CA 92083.



ACE R/C
Weeks Special

Ace's sport-scale version of the Weeks Special gives the thrill of a biplane and the performance of a pattern ship. The semi-symmetrical airfoil provides a wide performance envelope, and the wide-track landing gear makes ground handling easy. This plane was Dave Brown's choice for the 1988 Tournament of Champions.

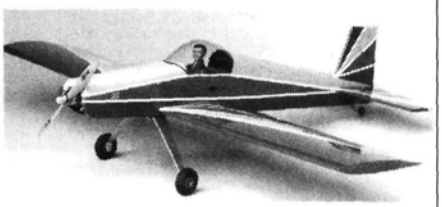
Each kit includes: rolled plans, step-by-step assembly manual, aluminum landing gear, formed canopy, epoxy-glass cowl and wheel pants. Special photo packs are available for documentation.

Specifications: wingspan, 72 inches; wing area, 1,650 square inches; weight, approximately 15 pounds; engine, ST3000, Q35-40, G-38, etc.

Part no. 50G5040

Price: $289.95

For more information, contact Ace R/C, 116 W. 19th St., P.O. Box 511, Higginsville, MO 64037.



CARDEN CORP.
Paydirt 60

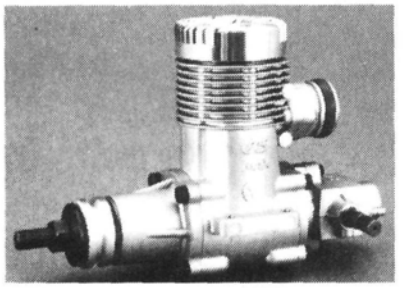
Carden Corp. has introduced the Paydirt 60—an intermediate-level, sport/aerobatic design. It offers smooth performance throughout a wide speed range. Its positive control and stability in high winds will particularly help less experienced pilots. Landings are slow and predictable. Advanced aerobatic pilots will be pleasantly surprised at its crisp precision and solid tracing—even at slow air speeds. This design is engineered to accept 70 to 91 4-stroke or 50 to 61 2-stroke engine/fuel-tank installations.

With very few parts, the kit can be ready for covering in eight hours. It features precision-cut wooden parts, foam wing cores with balsa sheeting, custom ailerons, high-quality canopy, generous hardware package, and custom polished-aluminum landing gear. The rolled plans are easy to read, and the detailed instruction manual includes construction photos.

Specifications: 60-inch wingspan; wing area, 800 square inches; weight, 7 to 8 pounds; wing loading, 21 to 23 ounces per square inch.

Price: $99.95 (introductory special), plus $5 S&H.

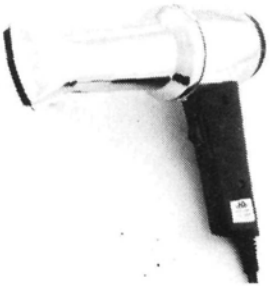
For more information, contact Carden Corporation, 1731 N.W. Madrid Way, Boca Raton, FL 33432.



GREAT PLANES
O.S. 65 VR-DF ABC

Modelers looking for a mid-size, ducted-fan engine can now look to O.S. Engines, which has just introduced the O.S. 65 VR-DF ABC. It has a new drum-valve induction system that improves performance, power and reliability. This ultra-high-rpm engine also has an ABC piston/sleeve construction for high compression and superior output. Weighing only 20.30 ounces and with an rpm range of 2,500 to 25,000, the 65 VR-DF produces 3.0bhp at 22,000rpm. This engine is designed to fit the most popular ducted-fan units.

For more information, contact Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.



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Heat Gun

This Hobby Dynamics thermostat-controlled Heat Gun is a light, versatile tool with a sturdy one-piece formed-steel handle, a great non-stick coated surface and a shoe jointing plate that won't separate. Special features include: a stand, tapered sides for perfect bonding and rounded edges to prevent scratching. The nose is designed for those hard-to-reach areas, and it won't dig in. This tool has a 90-day warranty.

For more information, visit your hobby shop, or contact Hobby Dynamics, 4105 Fieldstone, Champaign, IL 61821.

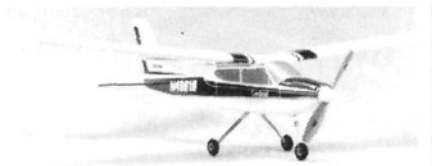


HOBBY SHACK
The SST 40 and ½A SST Kits

One of the most popular sport fun fliers of the '70s is back! Updated for '90s sport fliers, this ultra-clean contemporary design has a 40-size engine and reduced surface throws, and it's one of the finest trainers. Beginners find it easy to fly, but with a .60, the SST 40 packs enough performance to satisfy the most experienced pilots. High-quality die-cut balsa and hardwood parts and full-size plans with detailed construction drawings make the SST 40 an enjoyable building project.

Specifications: wingspan, 57 inches; wing area, 625 square inches; engine, .40 to .60 2-stroke or .60 to .90 4-stroke; 4-channel radio required.

For more information, contact Hobby Shack, 18480 Bandilier Circle, Fountain Valley, CA 92728.



GLOBAL HOBBY
Cessna 177 Cardinal

Thunder Tiger's new Cessna 177 is an electric ARF with a difference—power! Thanks to a specially designed propeller and an efficient 3:1 geared 540SP motor (standard equipment), long, leisurely flights with extra-long cruising power are possible. It's a perfect first model, because it's light, stable, easy to fly and very easy to assemble. Wings and tail surfaces are of built-up balsa and covered in painted Top-Kote plastic film. The fuselage is pre-built of ABS plastic with an internal light-ply structure. The builder does minor final-assembly tasks and installs his own radio.

Specifications: wingspan, 47.3 inches; wing area, 360 square inches; length, 36 inches; weight, 40 to 44 ounces; motor, 540SP; gearbox, 3:1; propeller, glass/nylon with spinner (all included). Not included: motor control; battery (6- or 7-cell, 900 or 1200mAh); 3-channel radio.

Price; $159.95

Part no. 111787

For more information, contact Global Hobby Distributors, 18480 Bandilier Circle, Fountain Valley, CA 92728.



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EZ Lam© is the first epoxy laminating resin that's specially formulated for model aircraft. This two-part, 2:1 resin and hardener is specially blended for use with lightweight fiberglass, carbon fiber, or Kevlar™ cloth. Its low viscosity allows it to flow easily into the weave of the cloth; it cures to a hard, strong, glossy finish; and it can be sanded easily. EZ Lam is ideal for use with .58-ounce fiberglass cloth over balsa-sheeted foam wings, or with 2-ounce glass-cloth over bare, molded-Styrofoam, "foamie" models. EZ Lam may be thinned with 99 percent isopropyl alcohol for applications where a lower viscosity is desired.

Prices: $18 (1½ pints); $26 (1½ quarts).

For more information, contact Aerospace Composite Products, P.O. Box 16621, Irvine, CA 92714.

PROFESSOR 40

(Continued from page 90)

im the whole package, and I expect he'll oon be tearing up the Southwestern skies n his own. When he does, I'm confident iat my mother-in-law, Wilma, will take p the student end of the buddy box!

The Futaba Professor 40 is well-esigned, well-made and attractively ackaged. Its semi-symmetrical airfoil ffers a comfortable mixture of stability ıecessary for beginners) and mild ıaneuverability (great for those with some xperience). There are a few small efficiencies in the instructions, but if an .RF trainer from one of the most respected /C companies is what you're after, the rofessor 40 deserves your consideration. fy guess is that Futaba is serious about iis expansion of its product line, and I on't be at all surprised to see its range of .RFs grow considerably over the next few ears. Question is, what's after that??

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utaba Corp. of America, *4 Studebaker, Irvine, CA 2718.*
.S./Great Planes Model Distributors, *1608 terstate Dr., P.O. Box 4021, Champaign, IL 61820.*
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ıp; *distributed by Frank Tiano Enterprises, 2460 V 85th Terr., Davie, FL 33324.* ■

RAT RACER

(Continued from page 72)

erobatic, but it handled these basic ma-euvers without any problems.

After a couple of days of flying with ıe 500 BB motor, I decided to see what ıe Rat really had, and I installed my Ul-a 800 cobalt motor, a 7-cell 1200mAh ack, and a 7x6 Taipan* prop. With this etup, the model was more than 6 ounces eavier. On the first launch with this sys-m, I threw the model in the same way s before. I discovered that the increased eight and consequent higher wing load-ıg of 23.3 ounces per square foot re-uired a more determined throw—the op and the tail end of the fuselage craped the ground. I brought the model ound, landed, checked the prop for amage (none) and launched again—this me with more gusto! The Rat got away ıfely and really took off!

A THOROUGHBRED RAT?

With the Ultra 800 and the 7-cell 200mAh pack, the Race Rat really ıoved out. Bob Sliff, who has flown in many electric pylon races, felt that it would be very competitive. I was most impressed by the fact that, although its speed was much greater than before, the model seemed to be more stable, and it was easier to fly. Unlike many racers, the Rat flies very predictably. With the increased weight, however, also came higher landing speeds, and this is where I appreciated the Rat's rugged construction! Although it has had several rough landings, it hasn't been damaged—not even a tear in the Oracover!

The Race Rat is a thoroughbred racer with predictable flight characteristics. It can be tailored to suit your flying ability: just use a suitable motor and battery combination. The Graupner Speed 500 BB motor with the 900mAh 7-cell pack gives a lively performance for sport fliers, while the Ultra 800 cobalt motor with the 1200mAh 7-cell pack gives true racing performance for serious competition pilots. The Race Rat is a fast electric that will surprise many people with its capabilities—and it's *quiet!*

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Novak Electronics, Inc., *128-C E. Dyer Rd., Santa Ana, CA 92707.*
Taipan; *distributed by Hobby Horn, 15173 Moran St. P.O. Box 2212, Westminster, CA 92684.* ■

HELI CHALLENGE

(Continued from page 101)

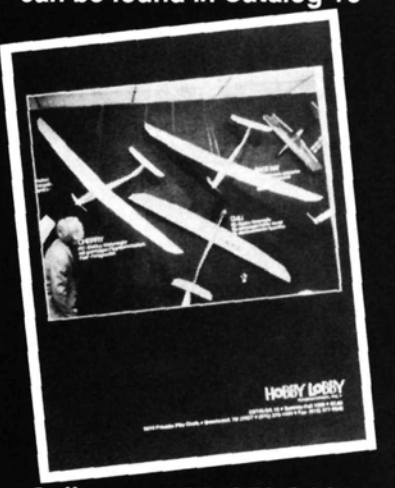
the helicopter to descend. This is often followed by an attempt to reduce its rate of sink by pulling back on the cyclic to keep the nose up. If allowed to continue, these errors will result in a reduction of rotor speed to a point below minimum flying lift and the helicopter will stall.

Try to make your machine descend at a 45- to 30-degree angle. Start the descent at a point where the helicopter will touch down just past where you're standing. Shoot a couple of approaches from this attitude and, when the helicopter gets down to around 15 feet, abort the descent by increasing the throttle and circling back around to begin another practice approach. The helicopter will descend with its nose pointed at you, so you might want to turn to one side and fly it while watching it over one shoulder. Since you'll have the sensation that the controls have been reversed, this attitude might help to prevent you from becoming disoriented.

(Continued on page 115)

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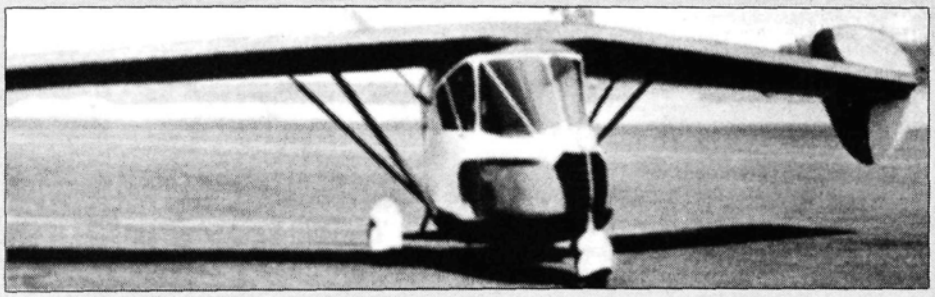
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NAME THAT PLANE

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Congratulations to Ken Trone of Toronto, Ontario, Canada, for correctly identifying the Hawker "Henley" two-seat medium bomber and target-towing monoplane shown in the September '90 issue! His entry was drawn from a total of 28 correct ones. Several thought the picture was of a Latecoere 299, but looks can be deceiving!



Originally designed as a high-performance, light bomber, the Henley first flew in 1937. Despite its intended mission, it was primarily used for target towing. Although 400 were ordered for production, only 200 were built. Half of these used the Rolls-Royce Merlin II 12-cylinder Vee liquid-cooled engine, and the other half used the Merlin III.

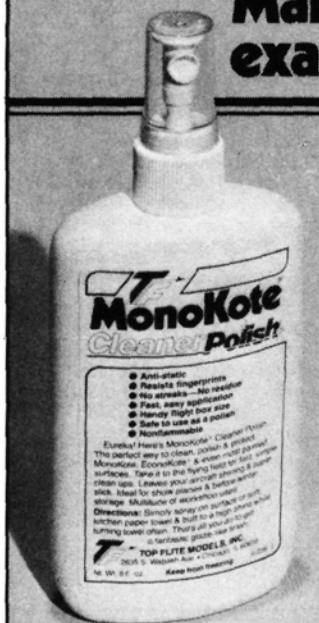
A somewhat obscure warbird, the Henley had a wingspan of 47 feet, 10.5 inches and a length of 36.5 feet. Its service ceiling was 27,000 feet, and its cruising range was 950 miles. It could reportedly climb to 20,000 feet in just over 19 minutes. Maximum speed at 17,000 feet was 272mph, and cruising speed at 15,000 feet was almost as fast—235mph. This plane would make an interesting scale subject—complete with target or sleeve in tow!

The winner will be drawn four weeks following publication from correct answers received (on a postcard delivered by U.S. Mail), and will receive a free one-year subscription to **Model Airplane News.** If already a subscriber, the winner will receive a free one-year extension of his subscription.

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HELI CHALLENGE

(Continued from page 111)

LAND, HO!

Now that you're completely in control of your "dummy" descents, it's time to consider a full-down landing! At first, you might prefer to set up in your circle a little further out than you've been practicing—just to give yourself more time to set up. Imagine a line from where the helicopter is to a spot on the ground just past you. Reduce the throttle slowly until the helicopter drops along your imaginary line. As it comes down the line, add a little throttle to see if you can get it to climb lightly. This practice will ensure that the helicopter isn't hanging just above a stall. To find the perfect rate of descent, I always play with the throttle as the helicopter comes down.)

Continue to allow the helicopter to come down. It should fly past you at about head level and, at this time, open the throttle gradually. Try to ease the machine almost back into a hover by pulling back on cyclic—just like you did when you stopped from the slow circle that you flew around yourself in hover practice (see, you've done this before!). Allow the helicopter to settle to the ground. This way, in all the excitement, you won't try to control the tail rotor as much as you would if you were trying to re-enter a hover.

The key to a safe, easy landing is keeping the helicopter's speed manageable. If it's moving too fast, it won't come down; if it's too slow, it will stall. Practice until you can get up and down without jerking the controls. You'll discover that the tail rotor tends to jump whenever you make a sudden throttle movement. This makes things seem really hairy when you're at low altitude—just like having the helicop-

(Continued on page 116)

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16	Standard J-1 Tr	22"$22	32½$30	65"$45		
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36	Westlnd Lysander	25"$18	37½$24	75"$38	100"$52	
35	Doug O-46-A Obsr	23"$24	34"$32	68"$46		
29	Boeing 100 Sport	15"$16	22½$24	45"$36	60"$48	90"$62
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39	Lock LightngP38	27"$19	39"$26	78"$45	★	
39	Cur P-36A Fightr	18½$15	28"$20	56"$34		112"$56
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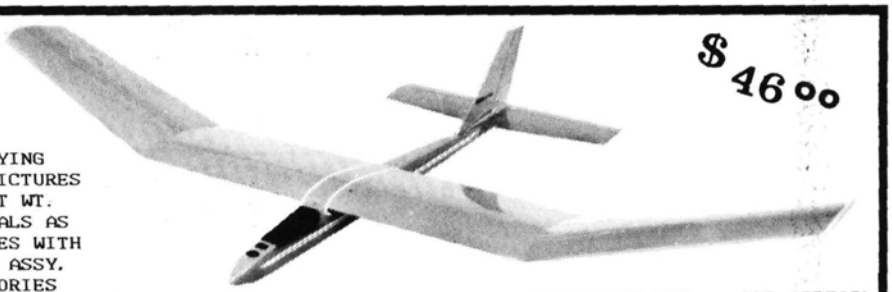
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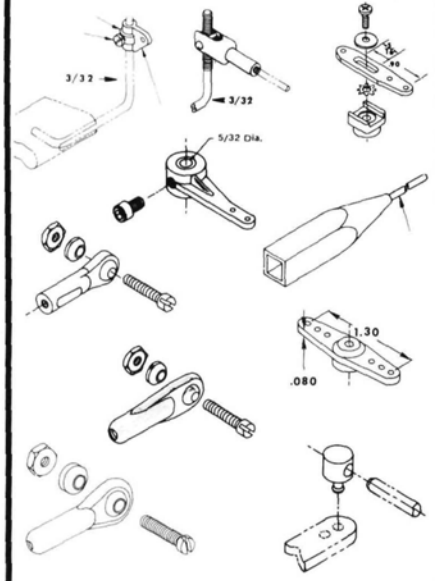
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HELI CHALLENGE

(Continued from page 115)

ter turn and point its nose right at you!

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KYOSHO CHALLENGE

(Continued from page 96)

flying was noticeably better each time.

Shortly after the St. Louis Fun-Fly in August '89, Tim called me to say he had been chosen as the Great Planes helicopter project leader. He had unearthed my file of Great Planes/Kyosho sponsorship suggestions, and he wanted to do something about this .30-size contest idea. The phone lines between us were buzzing that day, but there was a hear-a-pin-drop moment when I told Tim he'd have to become a first-class CD to have a first-class contest. After a pause, Tim said, "I guess I'm ready. Where do I start?"

Not quite 10 months later, the First Annual Kyosho Challenge stands as proof that Tim Lampe, ex-R/C motorcycle demo driver, did his homework and made a big contribution to our hobby. He attended fun-flys as a Kyosho rep and entered contests like the Schluter Cup and the Tangerine to learn what it takes to run a successful event.

The Hirobo Shuttle ("Starting-Belt Wars") led the Concepts, Enforcers and X-Cells into the modern small helicopter market. What might have been the chilly first annual "Lincoln Landings" or "Great Planes Presidents' Day Fly-In," or "The Valentine," or the "Hobbico Helinox," or "The Idles-Up of March" turned out to be the First Annual Kyosho R/C Helicopter Challenge. Maybe, later this year, when the GMP Viper is available, we'll have the "Return of the Snake-Eye." No matter what you call it, the .30-size helicopter contest is here to stay! ■

SPORTY SCALE

(Continued from page 61)

pany as a major co-sponsor. I promise to keep you posted as we get closer to the event.

FUTURES

I'm working on a few how- to articles that should interest you. So far, these include articles on how to sheet a foam

(Continued on page 120)

ULTRA HOTS

(Continued from page 120)

and glue the wing's trailing edge where marked. Glue plywood support W2 over W1. With the wing in place, drill a hole for a wing screw through W2 into F7 and 7A, and tap the hole with a 1/4-20 tap.

Assemble the wing's center section (F10, 11, 12A, B and C), and add 1/4 square balsa braces. Trim the assembly to fit properly, and drill holes for the sheet-metal screws. Then remove the center section and the wing from the fuselage.

FINAL ASSEMBLY

Determine the correct engine location, and drill holes for the mounting screws. Glue the 1/8 ply hatch retainer (F18), the balsa nose pieces (F9) and the basswood cowl-retainer blocks into place. Trim the cowl as needed. Cut the ailerons, elevators and rudder to shape, and final-sand. Assemble the wheel spats as shown on the plans.

COVERING

Sand all the balsa surfaces until they're smooth; start with 200-grit sandpaper, progress to 400-grit, and finish with 600-grit. Remove the balsa dust with a tack cloth, and then cover the surfaces with your favorite Mylar covering material. If you want an Ultra Hots decal, write to me.

SETTING UP

Everything should be straight, and the Ultra Hots' angles of incidence should be zero-zero-zero—engine, wing and stab. The balance point should be directly under the wing spar's forward edge. Up to 1/2 inch in front of this point is OK, but I don't recommend that you go behind it; the plane could be a handful if it's tail-heavy.

The extent of control travel is a matter of flying preference. If you want to "hot dog," put in all you can; for a mild airplane, 1/2 an inch of movement in each direction is good. The model will do a knife-edge loop with full rudder deflection.

The Ultra Hots has been wonderful for those who have built and flown it so far, and I know that you'll be pleased, too. When yours is finished, send me a picture with any comments you have. Good luck and good flying!

**Here are the addresses of the companies mentioned in this article:*

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Horner Sales, *14925 Kilbourne Ave., Midlothian, IL 60445.*

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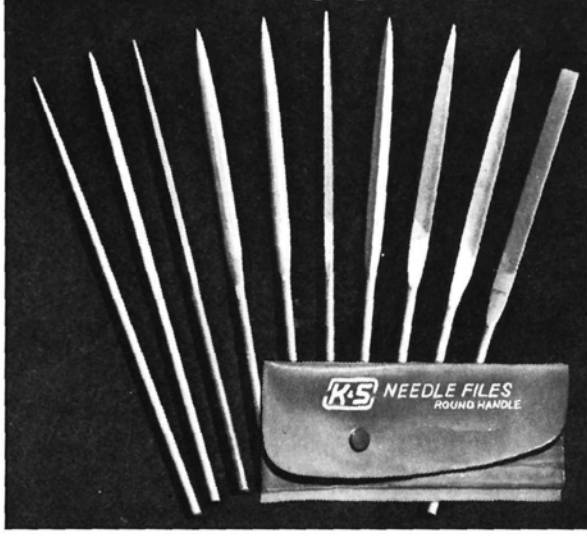
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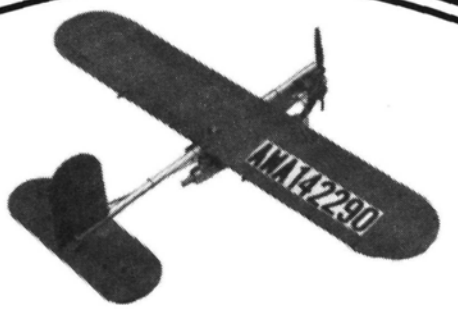


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SPORTY SCALE

(Continued from page 116)

wing, how to fiberglass a balsa surfac and how to make extensive use of carbon fiber materials. If there are any other in structional articles that you'd like to see please let me know. Also, if you'd like t comment on my column, drop MAN' new editor, Tom Atwood, a line and fi him in! (I better go back over this month' material, just in case one of you lunatic finds this subject matter too deep!)

**Here are the addresses of the companies mentioned in this article:*

***Robert Blaney,** 14 Parkview Rd., Long Valley, NJ 07853.*

***Davis Diesel,** P.O. Box 141, Milford, CT 06460.*

***O.S./Great Planes Model Distributors,** 1608 Interstate Dr., P.O. Box 4021, Champaign, IL 61820.*

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ULTRA HOTS

(Continued from page 58)

warp the wing. When the assembly is dry turn the wing over.

Glue the 1/2-inch-square basswoo servo rails into place. Cut holes in th inner ribs for the servo leads and the Y harness, and sheet the leading and trai ing edges as you did the top side. Ad capstrips, trim the outer ribs flush, an glue the wing tips into place. Sand th wing and balance it spanwise. If nece: sary, add weight to the tip.

Put the wing on the fuselage, and mar the locations of the wing dowels. Drill th wing-dowel holes through F2 and into th wing's leading edge. Now center the win on the fuselage, mark the location for W

(Continued on page 122)

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